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A National Environmental/Energy Workforce Assessment. New York

National Field Research Center, Inc, Iowa City, Iowa

Prepared for

Environmental Protection Agency, Washington, D C

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A National Environmental/Energy Workforce Assessment

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16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

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WORKFORCE ASSESSMENT

for

NEW YORK

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

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PREFACE

This report presents existing workforce levels, training programs, and career potentials and develops staffing level projections (1976 - 1981) based on available information for the State of New York in the environmental pollution control areas of air, noise, pesticides, potable water, radiation, solid waste, waste water, and energy. This study was carried out for the United States Environmental Protection Agency by National Field Research Center of Iowa City, Iowa.

The information and data presented in this report were compiled in large part from extensive interviews with professionals working in the respective areas and were supplemented by telephone surveys and research.

FOREWORD

The material herein contains the information and data collected for eight individual pollution control inventories conducted for New York. The format includes workforce profiles, projections, growth and career potential for each of the areas investigated. Growth projections are necessarily based on best professional estimates developed from available information and represent what are felt to be realistic figures by experts in the respective areas. The pollution control areas considered by this study are as follows:

Air

Noise

Pesticides

Potable Water

Radiation

Solid Waste

Waste Water

Energy

National Environmental Energy Workforce Assessment

Phase I

NEW YORK

State Summary

I. AIR

Administration of New York's air program is the responsibility of the Air Resources Division of the Department of Environmental Conservation. The Air Resources Division has a current staffing level of 211 persons. A large portion of these positions are held by engineers who are trained as chemical, mechanical, or sanitary engineers. The 26 persons classified as scientists are required to have a four-year degree in a physical or natural science. Program officials have indicated that persons with specialized training in one area, e.g., biology, are sought for any position which does not require a college degree. These persons are often involved in field inspection and monitoring activities.

Program officials are anticipating a moderate increase in staffing over the next five years, expected to average about six percent per year. This projection reverses past program direction since the Division has suffered a fifteen percent loss in personnel over the past two years.

II. NOISE

The New York Bureau of Noise Control, which is responsible for the state's noise program, is located within the Division of Quality Services of the State Department of Environmental Conservation. The Bureau is responsible for the enforcement of rules to control community noise emanating from industrial and commercial sources. The Department's authority covers all environmental noise problems including industrial noise which extends beyond the boundaries of a particular industrial establishment.

The Bureau is presently staffed with three engineers, a technician, and two other support positions. Only a very slight increase in the workforce level is anticipated for the noise control program over the next five years. Backgrounds in acoustics, engineering, and a scientific area, such as physics, will continue to be desirable for filling the few positions which are expected to open.

New York does not have the necessary financial resources to expand its noise program at either the state or local level without federal assistance. In general, there is expected to be very little career opportunity in this field over the next five years.

III. PESTICIDES

The pesticide control program in New York is under the jurisdiction of the Department of Environmental Conservation (DEC). Within the Department, program activities are carried out by the Bureau of Pesticides of the Division of Quality Services. The Bureau controls the certification of applicators and registration of pesticides and pesticide products.

New York's pesticide program is currently staffed by 19 persons and its 15 scientific personnel are involved in the administration of the program, registration and certification activities. Eleven field inspectors are located in DEC's nine regional offices. In addition to state personnel, there are approximately 10,000 commercial applicators and 25,000 private applicators in New York that will need to be certified under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as amended.

Professionals working in the Bureau of Pesticides anticipate that staffing in the program will increase from the current 19 programs to a total of 28 by 1981. This represents an increase of nine people, or an average growth of about eight percent per year. It is further anticipated that persons hired in the future will generally be professionals with educational backgrounds in the natural sciences. Some opportunities will also exist for technicians without college degrees, especially in field inspection activities.

IV. POTABLE WATER

The water supply program in the State of New York operates under the jurisdiction of the Bureau of Public Water Supply for the Division of Sanitary Engineering within the State Department of Health. There are currently 94 persons in the water supply program at the state level. Most of the engineers have degrees in sanitary or environmental engineering although the program activities are complemented by sanitarians and technicians.

The workforce in water supply in New York is expected to double over the next five years. Additional engineers, sanitarians, and technicians as well as clerks are expected to be recruited. This increase reflects growing program activity under the proposed assumption of primacy for the federal Safe Drinking Water Act (SDWA). This projected increase in workforce will be made possible largely through federal funding.

New York's decision to assume primacy for SDWA will result in heightened program activities and a need for an increased workforce at all levels. The greatest demand will be for engineers, particularly those with degrees in sanitary engineering, sanitarians and technicians.

V. RADIATION

The Bureau of Radiation, Division of Quality Services, of the State Department of Environmental Conservation shares responsibility for New York's radiation activities with the Bureau of Radiological Health of the State Department of Health. There are currently five nuclear generating plants licensed to operate in New York and at least sixteen more in various stages of planning or construction. New York has obtained agreement state status with the Nuclear Regulatory Commission.

There are approximately 19 people currently employed in radiation control at the state level including the Department of Environmental Conservation and the State Department of Health. Seven are engineers, most with backgrounds in physics or nuclear experience. Other staff serve in various capacities such as radiological health specialists.

Growth in the radiation program in the state will occur principally in three areas: nuclear power, radioactive waste disposal, and control of radiation from naturally-occurring sources. At the state level, workforce levels are expected to remain constant over the next five years.

VI. SOLID WASTE

Solid waste management program responsibilities are located in the Division of Solid Waste Management in the Department of Environmental Conservation (DEC). The state program emphasizes the development of local and regional solid waste management systems.

New York's Solid Waste Management Division has a current staff of 46 people. A majority of these are engineers. Civil, soil, and environmental engineers are sought for landfill operations; chemical, soil, and mechanical engineers for resource recovery. In addition to the engineers, the Division is made up of three scientists who are geologists, three technicians, and twelve administrative or clerical personnel. Statewide, it is estimated that there are more than 3,000 trained, local landfill operators in New York.

Program officials estimate that the Division will double within the next five years. The Division expects to obtain additional personnel as a result of the Resource Conservation and Recovery Act of 1976. A large increase in geologists and engineers is likely. It is anticipated that the number of sanitary landfills in New York will be reduced to about 300 in 1982, thereby reducing the need for operators and other landfill personnel. Moreover, it is expected that resource recovery will replace the need for landfills within the next five years.

VII. WASTEWATER

Responsibility for the wastewater program in New York rests with the Division of Pure Waters of the Department of Environmental Conservation (DEC). EPA has delegated to New York State the responsibility for administering both the municipal construction grants and NPDES permit programs.

The current staffing level for the Division of Pure Waters consists of 414 persons. A majority of those in the Division (227) are engineers. A large number of the engineers have training as sanitary or chemical engineers. The program also includes 67 technicians and 13 chemists. In addition, current estimates indicate that there are 1,107 certified municipal wastewater treatment plant operators in New York and a total of 1,992 persons working in these plants.

Personnel within the Division are projected to increase at a rate of about four percent per year over the next five years. This would increase the level from the current 414 to a total of 505, an increase of 91 persons. Engineers will continue to be the most numerous although the greatest percentage increase is anticipated in the chemist category.

A significant potential for trained treatment plant operators is also anticipated by program officials which are expected to increase by over one third the current number.

VIII. ENERGY

In 1975, the New York State Atomic and Space Development Authority was restructured and renamed the Energy Research and Development Authority. The previous mandate which emphasized nuclear development and space activities was altered to place the primary emphasis on the development of alternative sources of high yield, low cost energy.

The staff of the original authority was 29 in 1975. The 1976-1977 recommended staffing level for the expanded role of the authority was 214.

The New York State Emergency Fuel Office was created by executive order in 1974. The 1976 staffing level was 46. Responsibilities are in conjunction with administration of the mandatory fuel allocation program.

STATE OF NEW YORK - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	211	276	290	305	320	333	10%
NOISE[2]	6	3	7	8	9	9	22%
PESTICIDES[3]	47	47	54	54	54	54	3%
POTABLE WATER[4]	66	66	66	66	66	141	23%
RADIATION[5]	19	19	19	19	19	19	N/A
SOLID WASTE[6]	46	51	51	51	51	51	2%
WASTEWATER[7]	414	429	448	465	485	505	4%
ENERGY[8]	--	--	--	--	--	--	N/A
TOTALS	809	891	935	968	1004	1112	7%

[1]The above represents only personnel of the Air Resources Division.

[2]The above does not include law enforcement agencies or the private sector.

[3]The above includes state program personnel, but does not include an estimated 10,000 commercial and 25,000 private applicators that will require certification.

[4]The above does not include water supply and water treatment plant operators.

[5]The above includes personnel of the Departments of Environmental Conservation and Health.

[6]The above does not include private sector personnel.

[7]The above does not include wastewater treatment plant operators.

[8]No available data on people engaged in specifically pollution control activities.

EDUCATION

New York has a number of colleges and universities which offer programs in environmental science and pollution control technology. While only a small number of schools were contacted, it is evident that many unique educational curricula are available in the state.

Among four-year colleges, the following are examples of enviromental offerings: Renssalaer Polytechnic Institute in Environmental Engineering; Manhattan College in Environmental Engineering and Science; Cornell University in Environmental Engineering; and the Cooper Union for the Advancement of Science and Art in Environmental Studies.

At the two-year level programs are more limited but are expanding. Examples of these are Chemical Technology, Environmental Science Option at Erie Community College and Air and Water Pollution Control Technology at Sullivan County Community College.

LEGISLATION

The environmental/energy legislation for New York was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Conservation Law

Environmental Quality Review Law

Air Pollution Control Act

Custom Application of Pesticides Law

Solid Waste Collection, Treatment and Disposal Law

Water Pollution Control Law

Vehicle and Traffic Law

Solid Waste Recovery and Management Law

Tidal Wetlands Act

Freshwater Wetlands Act

Hazardous Substances Act

National Environmental Energy Workforce Assessment

Phase I

NEW YORK

State Report

13

STATE PROFILE

New York, the Empire State, has lost its first place ranking in population held since 1820. The 1975 estimated population was 18,120,000; second to California as of 1964. New York City is still the nations's largest with a population of 7,895,563 in 1970. The seven Standard Metropolitan Statistical Areas of the state had a combined population of 15,760,408 in the 1970 census report. Total area is 49,576 square miles.

The manufacturing industries rank first in number, employees, and size of payroll. Total value added by manufacture, $33.6 billion per year, is second to California. New York ranks first in value added by apparel and produces 24 percent of the nation's total; printing and publishing, 21 percent; instruments, 33 percent; and first in the miscellany category (jewelry, sporting goods, toys, silverware), 17 percent of the nation's total. It is a large producer of leather and paper products.

Non-farm employment averaged seven million workers in 1975. Wages and salaries totaled just under $60 billion. The per capita income was $6,603, sixth highest among the states.

Farm receipts for 1975 were approximately $1.5 billion. Two-thirds of the total was derived from livestock and dairy products. Hay, maple syrup, apples, cherries, melons, and potatoes are major elements of the farm crop portion. Large food processing industries are based on New York's agricultural output. The commercial fish catch was valued at $28 billion in 1975.

The state usually ranks first in the U.S. in production of talc, zinc, titanium, emery, wollastonite, and abrasive garnet. Salt, gypsum, lead, petroleum, clay, stone, and iron contributed to the mineral value of $392 million in 1975.

Tourism and business travel generates $3.4 billion a year. New York's 128 state parks attract more than 45 million visitors a year. Vacation areas include the Adirondack and Catskill Mountains, the Great Lakes, Finger Lakes, New York City, and Niagara Falls, and numerous historical sites.

NEW YORK POLLUTION CONTROL AND ABATEMENT AGENCIES

The New York Department of Environmental Conservation and the Department of Health share responsibility for the state's pollution abatement and control and environmental health activities.

The Department of Enviromental Conservation is divided into the Office of the Commissioner and six elements. The Commissioner's Office has direct responsibility for the State Environmental Board, the State Nature and Historic Preserve Trust, the Lake George Park Commission, and the Environmental Facilities Corporation. The six elements of the Department are: Legal Affairs, Enviromental Analysis and Permits, Communications and Education, Programs, Regional Operations, and Management.

The Program element is composed of the Divisions of Fish and Wildlife, Pure Waters, Air Resources, Resources and Land Management, Solid Waste Management, and Marine and Coastal Resources. The Pure Water Division administers the state's wastewater program, as well as the industrial waste program, through its Bureau of Industrial Programs. The primary objectives of this program are to:

> Set standards, consistent with Federal and State laws and regulations, for the discharge of municipal sewage and industrial wastes into the waters of the State;
>
> Require municipal, industrial and other polluters to reduce discharges and maintain effluent levels within acceptable limits through programs of permit issuance, monitoring and enforcement; and

Reduce the discharge of pollutants into the State's waters by providing financial and technical assistance to local governments for the construction and operation of modern, efficient sewage treatment facilities;

New York's air program is conducted under the authority of the Division of Air Resources. This Division is involved in the indentification, measurement, and analysis of atmospheric contaminants; developing new instruments for the detection and measurement of contaminants; adopting regulations to control the discharge of pollutants from new and existing sources; and providing technical consultation to communities and state agencies on air pollution matters, among other activities. The Division of Air Resources adminsters environmental protection programs in the area of noise control through its Bureau of Noise Control.

Enviromental programs in the area of radiological pollution control are administered in the Department through the Office of Environmental Analysis and Permits.

The Division of Solid Waste Management has as its primary goal the establishment of environmentally sound waste management practices by municipal and private corporations with optimum recovery and reuse of resources.

Activities conducted under the Solid Waste Program include:

1. Inspection of refuse disposal areas and enforcement of regulations;
2. Approval of new refuse disposal areas;
3. Training of solid waste facility operators and local officials;

4. Registration of septic tank cleaners and industrial waste collectors;

5. Administration of the comprehensive planning assistance program;

6. Administration of the construction planning assistance program;

7. Promotion of resource recovery practices;

8. Evaluation of new equipment and technology;

9. Development of "ultimate use" plans for existing disposal facilities;

10. Administration of the solid waste portion of the Environmental Quality Bond Act.

The Office of Environmental Manpower of the Division of Manpower and Employee Relations, which operates under the authority of the Management Element of the Department, is responsible for assuring that the Department has the necessary professional and technical workforce resources in order to carry out its pollution abatement and control activities. The Office provides in-service training in every area of environmental protection, recruits professionals for various programs, administers grants to conduct training activities, and carries out necessary certification activities, in addition to performing other vital functions with regard to workforce planning and development.

The New York State Health Department is composed of an Office of the Commissioner, which answers directly to the Governor of the state, and the following elements, each of which is broken down further into functional divisions: Health Care and Cost Control,

Budget and Office Services, Counsel, Health Communications and Education, Program Planning and Analysis, Health Care Standards and Enforcement, Preventive Services, Research and Development, New York City Health Services, and Community Health Services. The Community Health Services element is made up of the Divisions of Community Nursing; Controlled Substances Licensing; Narcotic Enforcement; and Sanitary Engineering. Within the Division of Sanitary Engineering are the Bureaus of Milk and Food Sanitation; Hospital and Institutional Engineering; Public Water Supply; Residential and Recreational Sanitation; Rodent Control; and Radiological Health. New York's water supply program is run under the direct authority of the Bureau of Public Water Supply. The Bureau of Radiological Health shares responsibility for the state's radiation protection program with the Bureau of Radiation of the Department of Environmental Conservation.

The Division of Laboratories and Research of the Preventive Services, Research and Development element houses the Department's analytical laboratory facility, which is utilized for the sampling, measurement and monitoring functions of the Department's pollution abatement and control activities.

GENERAL ADMINISTRATION MANUAL
NEW YORK STATE DEPARTMENT OF HEALTH

ORGANIZATION - DEPARTMENT OF HEALTH

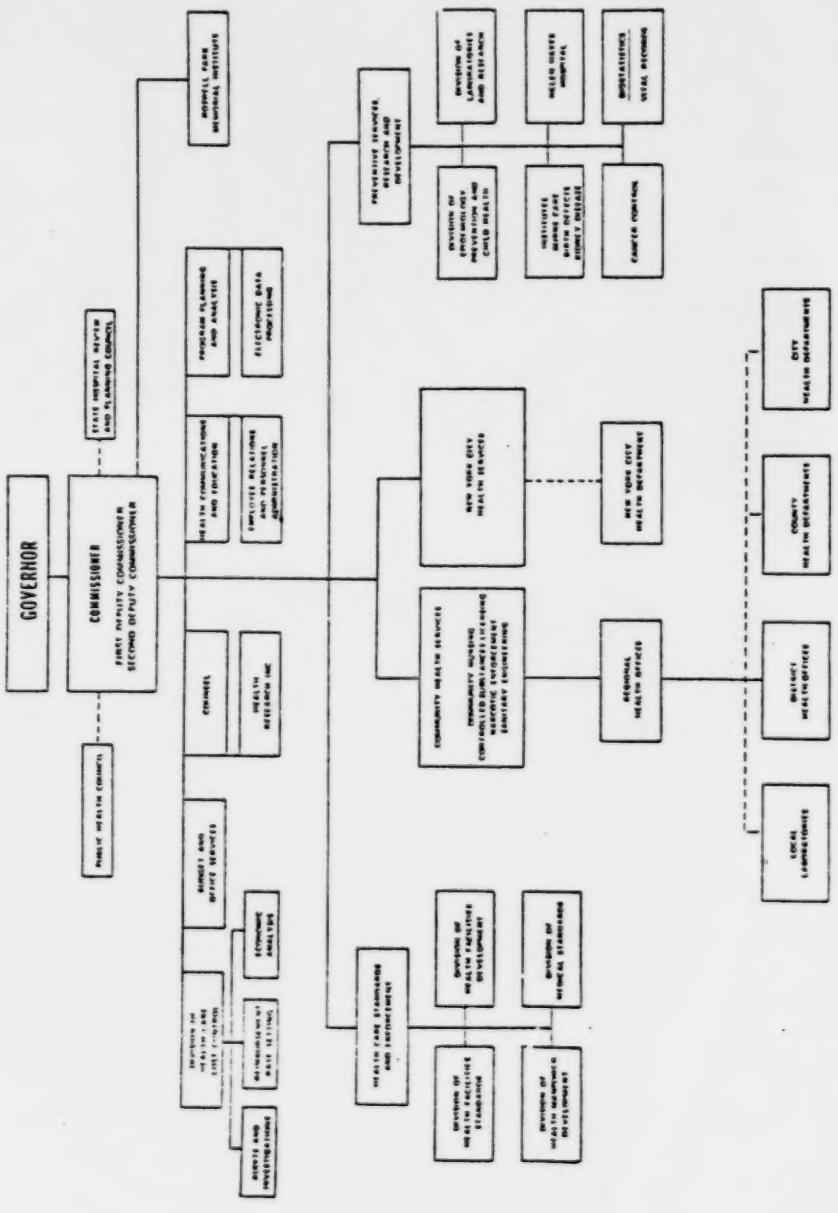


Figure 1.

NEW YORK STATE DEPARTMENT OF HEALTH

DIVISION OF SANITARY ENGINEERING

Functional Organization Chart - Central Office

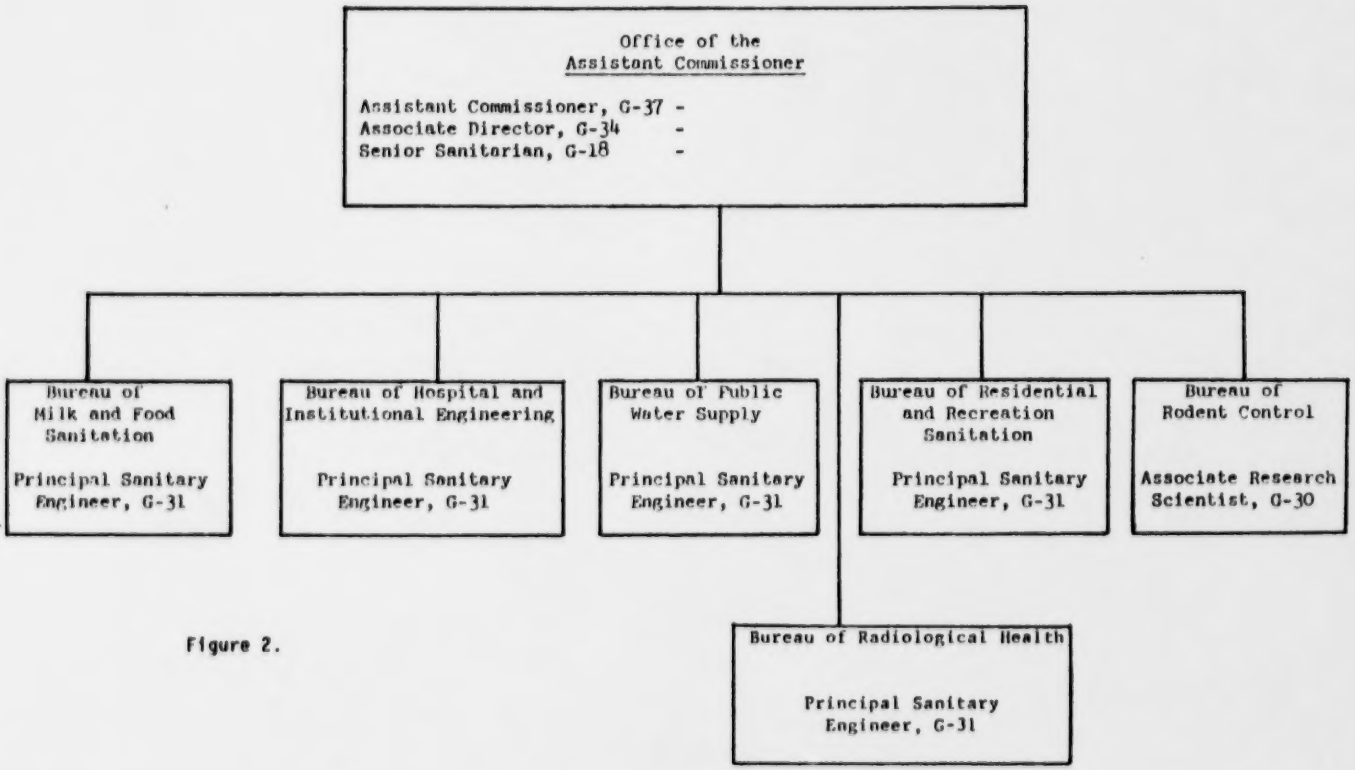

Office of the
Assistant Commissioner
Assistant Commissioner, G-37 -
Associate Director, G-34 -
Senior Sanitarian, G-18 -
Bureau of Milk and Food Sanitation
Principal Sanitary Engineer, G-31
Bureau of Hospital and Institutional Engineering
Principal Sanitary Engineer, G-31
Bureau of Public Water Supply
Principal Sanitary Engineer, G-31
Bureau of Residential and Recreation Sanitation
Principal Sanitary Engineer, G-31
Bureau of Rodent Control
Associate Research Scientist, G-30
Bureau of Radiological Health
Principal Sanitary Engineer, G-31

Figure 2.

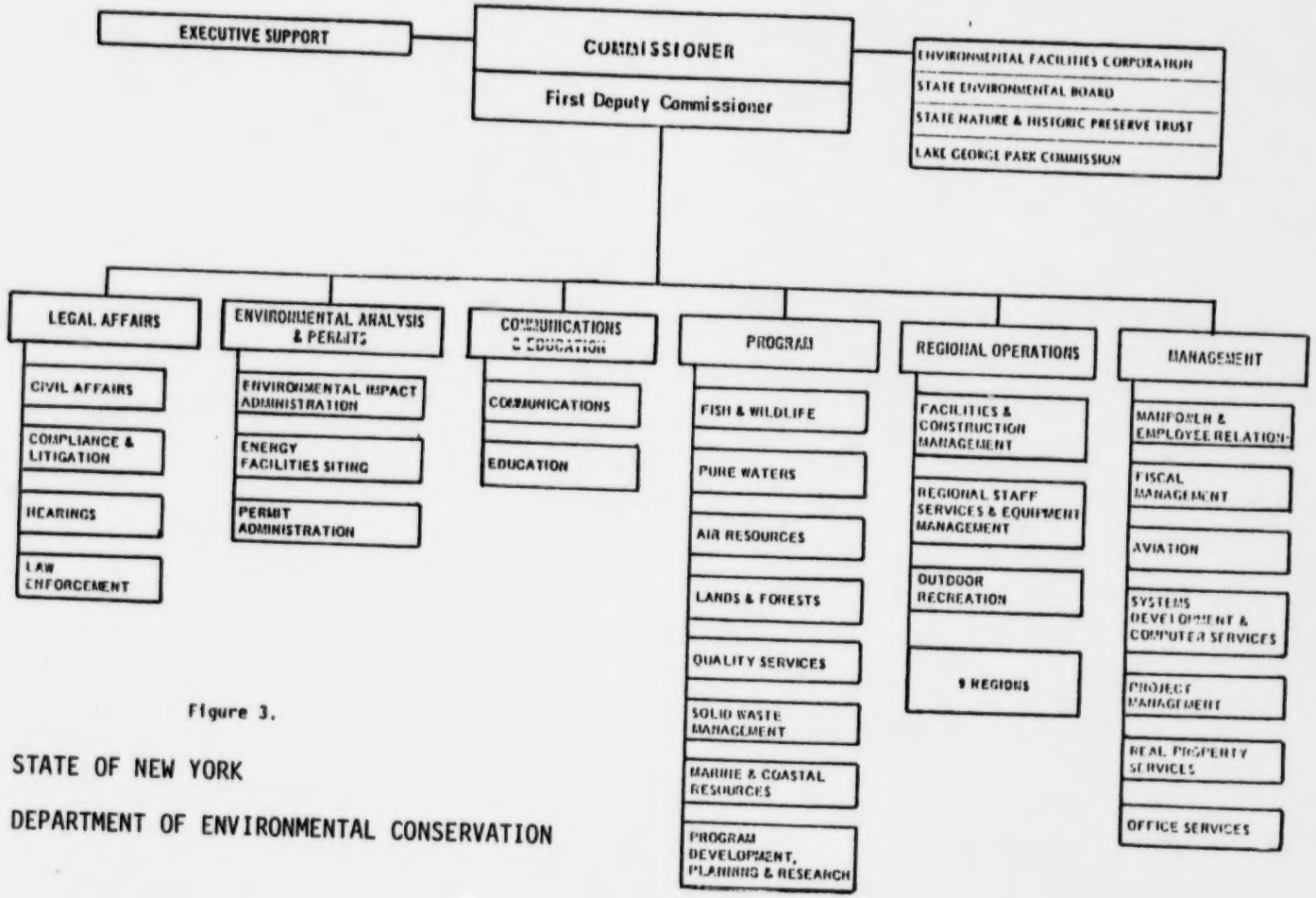


Figure 3.

STATE OF NEW YORK

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

ORGANIZATION CHART

OFFICE OF ENVIRONMENTAL MANPOWER

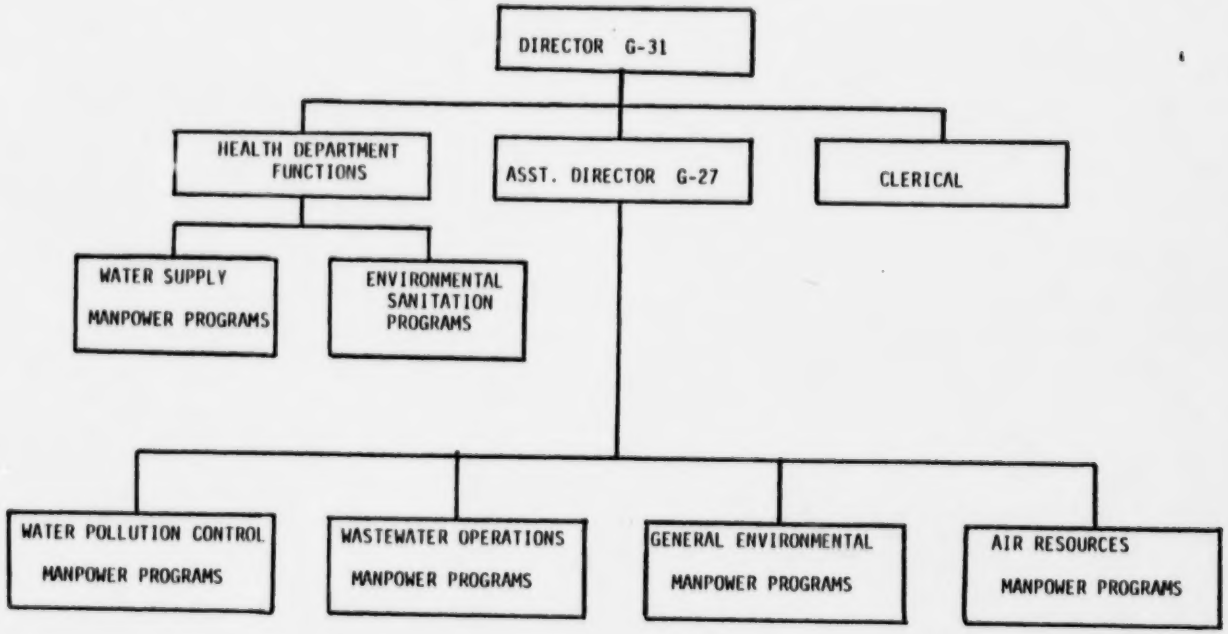


Figure 4.

Pollution Control and Abatement Programs

I. AIR

A. Introduction

The purposes of New York's air pollution control program are twofold:

1. controlling or abating air pollution currently in existence,
2. preventing new air pollution.

Administration of the program is the responsibility of the Air Resources Division in the Department of Environmental Conservation. Functions of the Division include research in the identification, measurement, and analysis of atmospheric contaminants and in the development of new and improved methods and instruments for detection and measurement of contaminants, review of plans for new installations that are likely to cause pollution, investigation of complaints, and maintaining an air monitoring network. The Division also provides technical assistance to local communities and other state agencies on air pollution matters.

The Division reports that it is making progress in controlling the level of air pollution and identifying sources. Regulations have been adopted governing open burning, dust and odors, and the density of smoke discharges. Regulations also limit the discharge of contaminants from automobile exhausts and crankcase ventilation systems and the sulfur content of fuels to be found in the New York City metropolitan area and in the state as a whole. Air quality classifications with corresponding standards have been completed for the entire state.

Priority activities in the Division include the control of significant source pollutants (these having the capability of emitting over 100 tons of air pollutants each year). There are 990 such facilities within New York and as of June, 1976, 852 were in compliance with the Law, 99 were in violation, and the status of the remaining 39 was unknown.

There are eight Air Quality Control Regions (AQCR) in New York as provided for in the State Implementation Plan (SIP). Table I lists the AQCR's and their attainment status of national ambient air quality standards as of June, 1976, provided by EPA's State Air Implementation Plan Progress Report. There are also two cities in the state, New York City and Rochester, which are required to have transportation control plans.

B. Workforce Profile

The information for this section was obtained primarily through on-site interviews with professionals working in the air quality program and various materials and documents provided by them.

The Air Resources Division has a current staffing level of 276 authorized positions. As indicated in Table II, a large portion of these are classified as engineers. Most of the engineers are trained as chemical, mechanical, or sanitary engineers. Although these specific disciplines are not required for the positions, Division professionals have indicated their preference for individuals with these backgrounds. The positions do require a four-year degree in engineering.

TABLE I

STATE OF NEW YORK

Attainment Status of National Ambient Air Quality Standards by Air Quality Control Region[1] (as of June 30, 1976)

AQCR / Pollutant	TSP	SO_2	CO	O_x	NO_2
043. New Jersey-New York-Conn. Interstate (N.Y. portion)	AR	AR[2]	MR[3]	AR	X[4]
158. Central New York	AR		X	AR	
159. Champlain Valley Interstate (N.Y. portion)		X[4]	2	AR	
160. Genesee-Fingerlakes	MR		X	AR	
161. Hudson Valley	AR	AR[4]	X	AR	
162. Niagara Frontier	AR	MR[3]	X	AR	
163. Southern Tier East	MR	AR2		AR[2]	2
164. Southern Tier West	AR	AR2		AR	2

[1] "X" indicates non-attainment of an applicable NAAQS, but no call for a SIP revision.

"AR" indicates non-attainment of an applicable NAAQS and a call for a SIP revision for attainment and maintenance.

"MR" indicates attainment of an applicable NAAQS, however, a SIP revision for maintenance is necessary.

A blank indicates attainment of an applicable NAAQS and no calls for SIP revisions.

[2] No or insufficient air monitoring data available. Attainment status is based on one or more of the following considerations:
(a) diffusion model
(b) emission inventory
(c) historical or incomplete data base
(d) measured air quality in adjacent AQCRs.

[3] Non-attainment of the NAAQS and a call for a SIP revision for maintenance only.

[4] Point source or other localized problem.

The 26 persons classified as scientists are required to have a four year degree in a physical or natural science and program officials have indicated that persons with specialized training in one area, e.g., biology, are sought for these positions. The Division also includes 64 technical positions which do not require a college degree. These persons are often involved in field inspection and monitoring activities and some amount of college training or prior relevant work experience is considered helpful. The persons listed in the table as "others" are clerical and administrative support positions.

TABLE II

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Air Resources Division
Current (1977) Staffing Level

Position	1976
Engineer	105
Scientist	32
Technician	81
Other	58
TOTAL	276

C. Workforce Projections

Figures in this section are based upon the best professional judgements of personnel working in the state's air pollution control program. They represent projected growth within the Air Resources Division.

Program officials are anticipating a moderate increase in staffing over the next five years. It is expected to average about 6% per year as illustrated in Table III. This projection reverses past program direction since the Division has suffered a 15% loss in personnel over the past two years. This was caused primarily by budget cuts to the program.

Workforce demand is expected to continue for the same occupational categories that currently exist. Jobs are classified under the state's civil service system and the requirements are not expected to change. The greatest demand will continue for engineers although scientists show the greatest increase on a percentage basis.

Turnover in the air program is extremely low, with what little there is, occurring in the sub-professional categories. Program officials indicate there is virtually no turnover in professional levels. One reason for this is that state salaries are considered to be good - higher than in neighboring states.

TABLE III

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Air Resources Division
Workforce Projections to 1982 (est.)

Position	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	105	110	115	120	124	N/A	3%
Scientist	32	35	38	41	44	N/A	7%
Technician	81	85	89	93	97	N/A	3%
Other	58	60	63	66	68	N/A	3%
TOTAL	276	290	305	320	333	N/A	4%

D. Training and Certification

Training for the air quality program is conducted by DEC's Office of Manpower Development and Training. The office has three persons devoted to air resources manpower and training programs. Training programs offered to state and local officials include a course in visible emissions (smoke observation) at which approximately 500 people are trained each year and a course in air pollution instrumentation. In addition, Division personnel make use of EPA-designed package courses which are offered by the Manpower Office. Program professionals expressed support for EPA sponsored courses but commented that budget constraints prevented the Division from sending as many people as they would like. In FY 1976, thirty persons from New York attended courses offered by EPA's Air Pollution Training Institute in Research Triangle Park, North Carolina.

E. Career Potential

The potential for future jobs in air pollution control at the state level in New York is limited. Due partially to budgetary constraints, the program is anticipated to grow only moderately over the next five years. The opportunities that do exist will require professional training for the most part. Engineers and scientists will be in greatest demand. Several opportunities will also exist for technicians without four year degrees.

F. Conclusion

New York's air pollution control program is responsible for the control or abatement of existing air pollution and the preventation of new air pollution. The current program staff is anticipated to increase moderately over the next five years, subject to budgetary constraints. Career opportunities are expected to be good for those trained as engineers, scientists, and technicians.

II. NOISE

A. Introduction

The New York Bureau of Noise Control, which is responsible for the state's noise program, is located within the Division of Air Resources of the State Department of Environmental Conservation.

The Bureau is responsible for the enforcement of rules to control community noise emanating from industrial and commercial sources. The Department's authority in control covers all environmental noise problems, which includes industrial noise that extends beyond the boundaries of a particular industrial establishment. Noise within industrial facilities is covered under the federal Occupational Safety and Health Act.

There are 161 communities in the state of New York which have local noises ordinances. Of these, 148 have regulations with regard to nuisance, 17 have zoning regulations, 60 have vehicle regulations, 15 have regulations which cover recreational vehicles, 9 regulate aircraft noise, 34 regulate construction noise, and 19 regulate building noise. This breakdown is depicted in Table IV on the following pages.

TABLE IV

COMMUNITY NOISE CONTROL ORDINANCES IN THE STATE OF NEW YORK

Jurisdiction	1970 Population	Nuisance	Zoning	Vehicle	Rec/Vehicle	Aircraft	Const.	Building
Adams	1,951	0	-	-	-	-	-	-
Albany	115,781	-	0	-	-	-	-	-
Albion	5,122	0	-	-	-	-	-	-
Alexandria Bay	1,440	0	-	-	-	-	-	-
Allegany	2,050	0	-	-	-	-	-	-
Altamont	1,561	0	-	-	-	-	-	-
Altmar	448	0	-	-	-	-	-	-
Amityville	9,794	0	-	-	-	-	-	-
Amsterdam	25,524	0	-	0	-	-	-	-
Andover	1,214	0	-	0	0	-	-	-
Angola	2,676	X	-	0	-	-	0	X
Arkport	984	0	-	0	0	-	0	-
Atlantic Beach	1,640	0	-	-	-	-	-	-
Attica	2,911	0	-	-	-	-	-	-
Auburn	34,599	-	X	-	-	-	-	-
Babylon	12,897	0	-	-	-	-	-	-
Bainbridge	1,674	0	-	0	-	-	0	0
Ballston Spa	4,968	0	-	-	-	-	-	-
Bayville	6,147	0	-	0	0	0	X	X
Beacon	13,255	0	-	0	-	-	0	-
Bellport	3,046	0	-	0	-	0	-	-
Binghamton	64,123	-	X	-	-	-	-	-
Black River	1,307	0	-	0	-	-	-	-
Blooming Grove	8,813	X	-	0	-	-	0	-
Boonville	2,488	X	-	0	-	-	X	X
Briarcliff Manor	5,892	0	-	0	0	-	0	-
Brightwaters	3,808	0	-	0	-	0	-	-
Brockport	7,878	0	-	0	-	-	-	0
Brookhaven	245,260	X	X	-	X	-	X	X
Buchanan	2,110	-	X	-	-	-	-	-
Buffalo	462,768	0	-	0	-	-	-	-
Camillus	1,534	0	-	0	0	-	0	-
Canandaigua	10,488	0	-	-	-	-	-	-
Canastota	5,033	0	-	-	-	-	-	-
Canton	6,398	0	-	0	-	-	-	-
Carlton	2,540	-	0	-	-	-	-	-
Castleton-on-Hudson	1,730	0	-	-	-	-	-	-
Celoron	1,456	0	-	-	-	-	-	-
Central Square	1,298	0	-	-	-	-	-	-
Chateaugay	976	0	-	-	-	-	-	-
Chatham	2,239	X	-	-	-	X	-	-
Chemung	2,156	-	X	-	-	-	-	-
Chittenango	3,605	0	-	-	-	-	-	-
Clifton Springs	2,058	-	0	0	-	-	-	-
Clinton	2,271	0	-	-	-	-	-	-

Jurisdiction	1970 Population	Nui-sance	Zon-ing	Ve-hicle	Rec/Ve-hicle	Air craft	Const.	Build-ing
Clyde	2,828	0	-	-	0	-	-	-
Cohoes	18,653	0	-	0	-	-	-	-
Colonie	8,701	-	-	-	0	-	-	-
Cooperstown	2,403	0	-	-	-	-	-	-
Corning	15,972	0	-	-	-	-	-	-
Cornwall	3,131	0	-	-	-	-	-	-
Cortland	19,621	-	X	-	-	-	-	-
Croton-on-Hudson	7,523	0	-	-	-	-	-	-
Delevan	994	0	-	-	-	-	-	-
Depew	22,158	0	-	0	-	-	0	0
Dexter	1,061	0	-	-	-	-	-	-
Dobbs Ferry	10,353	0	-	0	-	-	-	-
Dunkirk	16,855	0	-	-	-	-	-	-
East Hampton	1,753	0	-	-	-	-	-	0
East Rochester	8,347	0	-	0	-	-	0	-
East Syracuse	4,333	0	-	0	-	-	-	-
Elbridge	1,040	0	-	-	-	-	-	-
Elmira (C)	39,945	-	X	-	-	-	-	-
Elmira (T)	8,408	0	-	0	0	-	-	-
Fair Haven	859	0	-	0	-	-	-	-
Falconer	2,983	0	-	0	-	-	-	-
Farmingdale	9,297	0	-	-	-	-	0	-
Farmington	3,565	0	-	-	-	-	-	-
Fayetteville	4,996	X	-	X	-	-	-	-
Floral Park	18,466	0	-	-	-	-	-	-
Fonda	1,120	0	-	-	-	-	-	-
Fort Plain	2,809	0	-	-	-	-	-	-
Freeport*	40,374	0	-	0	0	0	-	-
Friendship	1,285	0	-	-	-	-	-	-
Garden City	25,373	0	-	-	-	-	-	-
Geneva	16,763	0	-	-	-	-	-	-
Glen Cove	25,770	0	-	-	-	-	-	-
Glens Falls	17,222	0	-	-	-	-	-	-
Glenville	28,969	X	-	0	-	-	0	-
Grand Island	13,977	X	-	X	-	-	X	X
Greenburgh	85,827	X	-	X	-	-	X	-
Greenport	2,481	0	-	-	-	-	-	-
Hamburg	10,486	0	-	0	-	-	-	-
Hamilton	3,636	0	-	-	-	-	-	-
Hammondsport	1,066	0	-	-	-	-	-	-
Hempstead	39,411	0	-	-	-	X	-	-
Hornell	12,144	0	-	-	-	-	-	-
Hudson	8,940	X	-	0	-	-	-	X
Huntington	12,601	0	-	-	-	-	0	-
Islip	7,692	0	-	-	X	-	0	-
Ithaca	26,226	X	-	0	-	-	0	0
Jamestown	39,795	0	-	0	-	-	0	-
Kingston	25,544	0	-	0	-	-	-	-
Lackawanna	28,657	0	-	0	-	-	0	-
Lake George	1,506	0	0	-	-	-	-	-
Lansing	-------	0	-	-	-	0	-	-
Little Falls	7,629	0	-	0	0	0	0	X
Lockport	25,399	0	-	-	-	-	-	-

Jurisdiction	1970 Population	Nuisance	Zoning	Vehicle	Rec/Vehicle	Aircraft	Const.	Building
Long Beach	33,127	0	-	-	-	-	-	-
Lynbrook	23,776	0	-	-	-	-	-	-
Lyons	4,496	0	-	0	-	-	-	-
Macedon	1,168	0	-	-	0	-	-	-
Mamaroneck	18,909	0	-	X	-	-	-	-
Marion	850	0	-	0	-	-	-	-
Medina	6,415	0	-	0	-	-	-	-
Middletown	22,607	0	-	0	-	-	-	-
Montour Falls	1,534	0	-	-	-	-	-	-
Mount Vernon	72,778	0	-	0	0	-	0	-
Murray	4,209	0	-	-	-	-	-	-
New Rochelle	75,385	0	-	-	-	-	-	-
New York City	7,895,563	0	X	X	-	-	-	X
Newburgh	21,593	0	-	0	-	-	0	0
Niagara Falls	85,615	0	-	-	-	-	-	-
Niskayuna	6,186	-	X	-	-	-	-	-
N. Tonawanda	36,012	0	-	-	-	-	-	-
Norwich	8,843	0	-	-	-	-	0	-
Odessa	606	0	-	-	-	-	-	-
Ogdensburg	14,554	X	-	0	-	-	0	X
Olean	19,169	0	-	0	-	0	-	-
Oneida	11,658	0	-	-	-	-	-	-
Oneonta	16,658	X	-	-	-	-	0	X
Ossining	21,659	0	-	-	-	-	-	-
Oswego	20,913	0	-	-	-	-	-	-
Peekskill	19,283	0	-	-	-	-	-	-
Penn Yan	5,168	0	-	-	-	-	-	-
Phelps	1,989	0	-	-	-	-	-	-
Plattsburgh	18,715	X	-	0	-	-	-	-
Pomona	1,792	0	-	0	-	-	0	-
Poughkeepsie	32,029	0	-	0	-	-	-	-
Rensselaer	10,136	0	-	-	-	-	-	-
Ridgeway	7,209	0	-	-	-	-	-	-
Rochester	296,233	0	-	-	-	-	-	-
Rome	50,148	0	-	-	-	-	-	-
Rye	15,869	X	-	X	0	-	X	X
Salamanca	7,877	0	-	-	-	-	-	-
Saranac Lake	6,086	0	-	-	-	-	-	-
Saratoga Springs	19,906	0	-	-	-	-	0	0
Savannah	636	0	-	-	-	-	-	-
Schenectady	77,958	0	-	-	-	-	-	-
Seneca Falls	7,794	0	-	-	-	-	-	0
Shelby	5,366	-	0	-	-	-	-	-
Sherrill	2,986	X	-	-	-	-	-	-
Smithtown	12,000	X	-	0	-	-	0	-
Sodus	1,831	0	-	0	-	-	-	-
Southampton	4,904	0	-	-	-	-	-	-
Southport	11,976	-	X	-	-	-	-	-
Stony Point	12,704	0	-	-	-	-	-	-
Suffern	8,273	0	-	-	-	-	X	-
Syracuse	197,297	0	-	-	-	-	-	-
Tonawanda	21,898	0	-	0	-	-	-	-

Jurisdiction	1970 Population	Nuisance	Zoning	Vehicle	Rec/Vehicle	Aircraft	Const.	Building
Troy	62,918	0	-	0	-	-	0	-
Utica	91,611	0	-	-	-	-	-	-
Wallkill	1,849	X	X	-	-	-	-	-
Waterloo	5,418	0	-	0	-	-	-	-
Watervliet	12,404	0	-	0	-	-	0	-
Watkins Glen	2,716	0	-	-	-	-	-	-
Wayland	2,022	0	-	-	-	-	-	-
White Plains	50,125	X	-	0	-	-	-	-
Williamstown	1,919	0	-	0	-	-	-	-
Wolcott	1,617	X	X	-	-	-	-	-
Yonkers	204,297	0	-	-	-	-	-	-

X = regulation includes acoustical criteria
0 = regulation does not include acoustical criteria
- = No regulation

Table V represents state-wide noise restrictions for the state of New York.

TABLE V

STATE OF NEW YORK

State-wide Noise Restrictions
1976

Motor Vehicle Mufflers	Motor Vehicle Sound Level Limits	Motorcycle Sound Level Limits	Snowmobile Sound Level Limits	Motor-Boat Mufflers	Motorboat Sound Level Limits
Yes	Yes, for over 10,000 lbs.	No	Yes	Yes	No

Property Line Sound Level Limits

Status	Relationship to Local Noise Ordinances
May adopt regs.	Local gov't may be stricter

Source for Table V: Sound and Vibration Magazine, Dec. '76

B. Workforce Profile

Information concerning staffing levels for the noise control program in New York was obtained primarily through on-site interviews with professionals working on the program. The profile indicated is for persons working in the Bureau of Noise Control.

TABLE VI

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Air Resources Division
Bureau of Noise Control
Current (1977) Staffing Level

Position	1977
Engineer	2
Technician	1
Other	0
TOTAL	3

C. Workforce Projections

Only a very slight increase in the workforce level is anticipated for the Noise Control Program over the next five years. Professionals working on the program expect turnover to be negligible.

TABLE VII

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Air Resources Division
Bureau of Noise Control
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	3	2	4	4	5	5	N/A	18 %
Technician	1	1	1	2	2	2	N/A	20 %
Other	2	[illegible]	2	2	2	2	N/A	0
TOTAL	6	3	7	8	9	9	N/A	22 %

D. Training and Certification

State program personnel are provided with informal, on-the-job training due to the small number of people in the program and the fact that there is almost no turnover. Positions in noise control and abatement normally require a four-year degree as a minimum, usually in engineering or a science such as physics.

E. Career Potential

Career potential in noise control in New York is expected to be extremely limited over the next five years, unless increased federal funds become available. Backgrounds in acoustics, engineering, and a science such as physics will continue to be desirable to fill the few positions which are expected to be open.

F. Conclusion

New York does not have the necessary financial resources to expand its noise program at either the state or local level without federal assistance. Traditional backgrounds in acoustics, engineering and some sciences will continue to be required to perform program activities, although there is expected to be very little real career opportunity in this field over the next five years.

III. PESTICIDES

A. Introduction

The pesticide control program in New York is under the jurisdiction of the state's Department of Environmental Conservation (DEC). Within the Department, program activities are carried out by the Bureau of Pesticides Management of the Division of Resources and Land Management. The Bureau controls the certification of applicators and registration of pesticides and pesticide products.

Legal authority for the program exists in New York's Environmental Conservation Law and the state has been classifying restricted use pesticides and administering a restricted use pesticides program since 1971. The state has established eleven categories for commercial applicator certification. The commercial categories include:

1. Agricultural Pest Control
2. Forest Pest Control
3. Ornamental and Turf Pest Control
   a) Ornamental and Shade Trees including Turg
   b) Turf
4. Seed Treatment
5. Aquatic Pest Control
   a) Aquatic vegetation control
   b) Aquatic insect control
   c) Undesirable fish control
6. Right-of-Way Pest Control
   a) Highway right-of-way
   b) Railroad right-of-way
   c) Utility and Pipeline right-of-way
7. Industrial, Institutional, Structural and Health Related Pest Control
   a) Structural and rodent
   b) Fumigation
   c) Termite
   d) Lumber and wood products
   e) Construction

f) Food processing
g) Cooling towers
h) Other
8. Public Health Pest Control
9. Regulatory Pest Control
10. Demonstration and Research Pest Control
11. Aerial Application
a) Pilot
b) Agricultural and forestry
c) Right-of-way
d) Public health;

and the six private categories include:

1. Field and Forage
2. Fruit
3. Vegetable
4. Greenhouse and Florist
5. Nursery, Ornamental and Turf
6. Livestock and Poultry.

B. Workforce Profile

Information for this section was provided primarily through on-site interviews with professionals working in the pesticides program and the use of materials and documents supplied by them.

New York's pesticide program is currently staffed by 29 persons who are grouped into two occupational categories as shown in Table VIII. The 24 scientists listed include persons involved in the administration of the program, registration and certification activities, and 20 field inspectors located in DEC's nine regional offices. The function of the inspectors is to check commercial and private applicators to ensure that they are in compliance with federal and state laws and regulations. They are responsible for performing regular inspections and reporting suspected violations. These positions are currently held by persons classified by the state as scientists

which requires professional training in one of the natural sciences, usually chemistry. It is estimated by program officials that the field inspectors could be non-professionals such as technicians. The persons classified in the table as "other" are clerical personnel.

In addition to state program personnel, program professionals have estimated that there are 10,000 commercial applicators and 25,000 private applicators in New York that will need to be certified under the law. This figure of 25,000 is considered to be less than half of the total farmers in the state.

TABLE VIII

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Resource and Land Management
Bureau of Pesticide Management
Current (1977) Staffing Level

Position	1977
Scientist	24
Other	23
TOTAL	47

C. Workforce Projections

Data contained in this section was obtained primarily from on-site interviews with professionals and represents the best professional judgements of those persons.

Professionals working in the Bureau of Pesticides anticipate that staffing in the program will increase from the current 47 persons to a total of 54 by 1981. This represents an

increase of seven people or an average growth of about 3% per year as indicated in Table IX. Program activities are considered to be similar to those currently performed with an emphasis on field inspection activities and re-certification of applicators. Commercial applicators must be re-certified every six years (renewed annually) and private applicators must be re-certified at five year intervals (renewed every three years). It is anticipated by program officials that persons hired in the future will generally be professionals with education backgrounds in the natural sciences. They also expect some opportunities to exist for technicians, without college degrees, especially in the field inspection activities. Professionals also indicated that when hiring new personnel, industry experience is considered more important than educational training.

Turnover has been non-existent in the program until now and, therefore, cannot be projected in the table.

TABLE IX

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Resource and Land Management
Bureau of Pesticide Management
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Scientist	24	24	29	29	29	29	N/A	4%
Technician	0	0	2	2	2	2	N/A	N/A
Other	23	23	23	23	23	23	N/A	0
TOTAL	47	47	54	54	54	54		3%

D. Training and Certification

Pesticide applicator certification training in New York is conducted by the State Cooperative Extension Service. Training is offered on a county basis and conducted by agents of the Extension Service. In the case of commercial applicator training, Extension Service training may be supplemented by outside specialists, trade and professional associations, and community colleges. The basic material used for training both private and commercial applicators is the Pesticide Applicator Course Training Manual of the Northeastern Regional Pesticide Coordinators prepared by Cornell University. Training materials for specific applicator categories and subcategories have been prepared by the State Extension Service. As of January 1, 1977, officials indicated that 9,459 commercial and 14,917 private applicators had been trained and that 9,435 commercial and 7,100 private applicators remained to be trained.

Commercial applicators must be re-certified every three years and to be re-certified must attend at least three approved training courses within a three-year period or take a re-certification exam.

The Bureau of Pesticides has no formal on-the-job training program, but provides an informal program to new personnel on the state pesticide law and regulations and the operation of the Bureau. Personnel are also encouraged to attend job related courses offered by local colleges and universities.

E. Career Potential

Potential for careers in pesticides in New York is anticipated to be very limited over the next five years. Professionals in the program have indicated that only nine additional positions are expected. The opportunities that do exist will be for professionals with backgrounds in the natural sciences and for technicians in field inspection activities.

Career opportunities for commercial applicators are difficult to predict since no projections of workforce growth in this area are available. Since this appears to be the area with greatest personnel turnover, it can be assumed that the greatest career potential exists here. Other career possibilities may be available in the fields of integrated pest management and pesticide disposal, but figures are generally not available to provide information on the types of jobs or numbers of people that might be required. An exception is a U.S. Department of Agriculture study done in 1972 which indicated the potential workforce requirements for integrated pest management to be more than 2,350 persons in New York. Most of these persons would be field scouts, a position requiring a high school education and some knowledge of entomology. The remaining persons would be professional crop protection specialists with backgrounds in the physical sciences. The Agriculture Department based its figures on one field scout per 2,000 acres of cropland and one crop protection specialist per 30,000 acres.

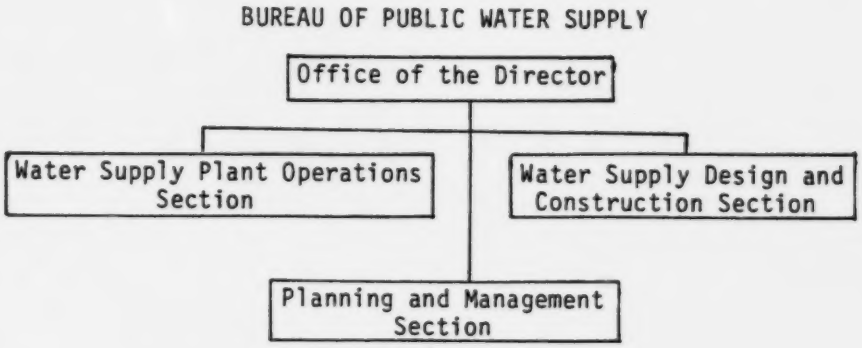
F. Conclusion

The pesticide program in New York is responsible for the certification of pesticide applicators, the registration of pesticides and inspection activities. Nineteen people currently work in the program, most of whom are professionals with educational backgrounds in the natural sciences. Growth in the workforce is expected to be small with most of the new positions requiring professionals with scientific training. There may also be some opportunities for technicians in field inspection activities.

IV. POTABLE WATER

A. Introduction

The Water Supply Program in the State of New York operates under the jurisdiction of the Bureau of Public Water Supply for the Division of Sanitary Engineering within the State Department of Health. The Bureau has the following organizational structure.


BUREAU OF PUBLIC WATER SUPPLY
Office of the Director
Water Supply Plant Operations Section
Water Supply Design and Construction Section
Planning and Management Section

The Water Supply Plant Operations Section:

1. Maintains inventories of water supplies;
2. Administers Operations Certification Program;
3. Serves as State Water Coordinator and coordinates emergency operation for water; acts as liaison with Civil Service Defense Commission; and
4. Certifies interstate carrier water supplies to the Public Health Service.

The Water Supply Design and Construction Section:

1. Reviews and approves plans for water supplies and treatment plants.
2. Inspects and evaluates water supplies and treatment plants.

3. Adminsters the intermunicipal water supply study programs to promote integrated water planning and operation.

The Planning and Management Section:

1. Maintains accurate records and reports on the status of all community water supplies including sanitary surveys, corrections, and water analysis data;

2. Coordinates enforcement actions;

3. Develops planning needs for public water supplies;

4. Coordinates the groundwater injection program.

The mission of the program is to ensure that all public water supplies in the state provide safe and sanitary drinking water to all citizens. The passage of the Safe Drinking Water Act (SDWA) in 1974 authorized the federal government to assist states in improving the quality of drinking water by establishing and enforcing the National Primary Drinking Water Regulations, which provide for assistance to the states through federal grants and the establishment of a program to protect underground sources of drinking water. Each public water supply in the state is required to monitor, test and otherwise operate in compliance with the regulations. All the states are encouraged to assume maximum responsibility for the implementation and enforcement of the regulations, which New York expects to do. The water supply program and SDWA are aided in these efforts by the Federal Water Pollution Control Act which sets water quality standards and controls the release of pollutants into the water systems.

There are presently 3,107 community water sources and approximately 16,000 non-community water sources in the state of New York.

Figure 5 shows the location of Health Department facilities throughout the state.

B. Workforce Profile

Information for this section was obtained primarily through interviews with program professionals and through various materials and documents provided by them.

There are currently 66 persons in the water supply program at the state level. Most of the engineers have degrees in sanitary or environmental engineering. The "other" category refers to clerical personnel for the most part. The occupational breakdown is presented in Tabel X below.

TABLE X

STATE DEPARTMENT OF HEALTH

Division of Sanitary Engineering
Bureau of Public Water Supply
Current (1977) Staffing Level

Position	1977
Engineer	49
Sanitarian	3*
Technician	2
Other	12
TOTAL	66

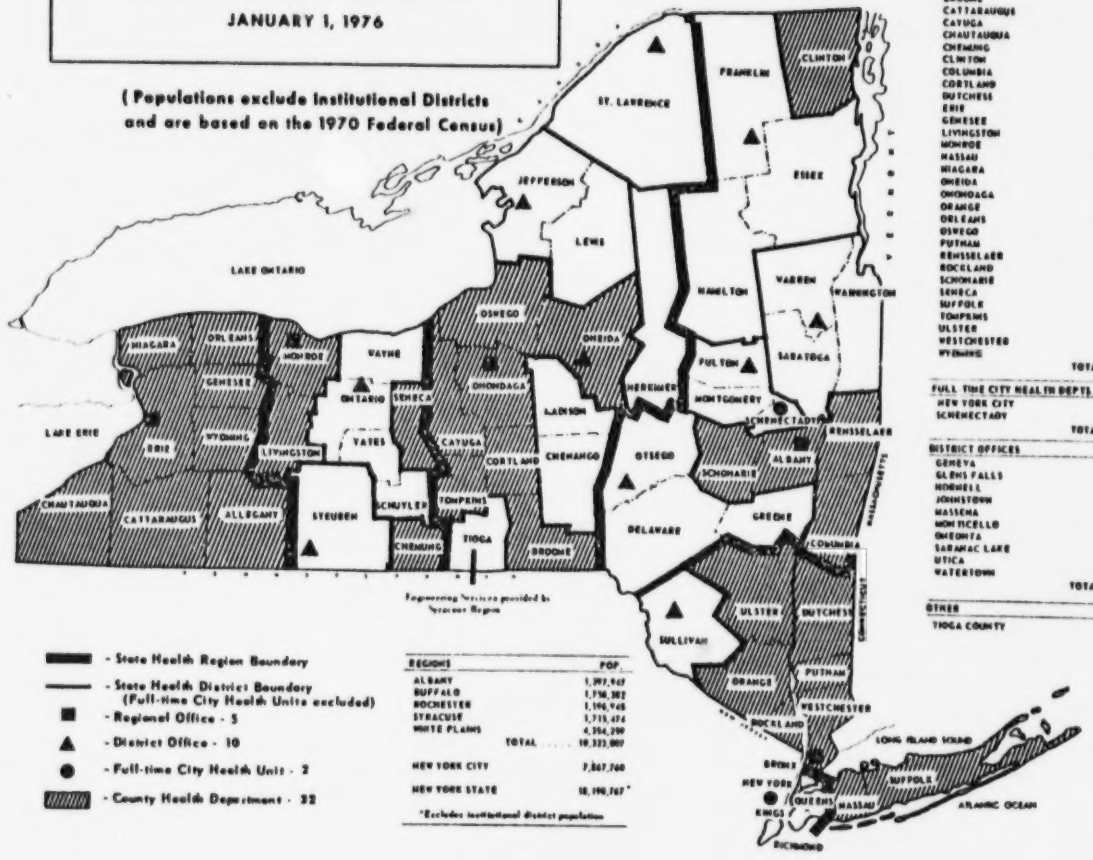
* Does not include 20 part-time.

State sanitarians are required to hold a four-year degree with a specialization in a natural science. Technicians are required to have

NEW YORK STATE HEALTH REGIONS AND DISTRICTS AND LOCAL FULL-TIME HEALTH DEPARTMENTS JANUARY 1, 1976

Figure 5.

(Populations exclude institutional Districts and are based on the 1970 Federal Census)



- State Health Region Boundary
- State Health District Boundary (Full-time City Health Units excluded)
- Regional Office - 5
- District Office - 10
- Full-time City Health Unit - 2
- County Health Department - 32

REGIONS	POP.
ALBANY	1,397,945
BUFFALO	1,750,382
ROCHESTER	1,196,948
SYRACUSE	1,719,474
WHITE PLAINS	4,256,298
TOTAL	10,321,047
NEW YORK CITY	7,867,760
NEW YORK STATE	18,190,767*

*Excludes institutional district population

COUNTY HEALTH DEPTS.	POP.
ALBANY	305,618
ALLEGANY	46,405
BROOME	221,815
CATTARAUGUS	81,666
CAYUGA	77,439
CHAUTAUQUA	147,305
CHEMUNG	101,537
CLINTON	72,934
COLUMBIA	51,510
CORTLAND	45,094
DUTCHESS	222,295
ERIE	1,113,491
GENESEE	50,722
LIVINGSTON	54,041
MONROE	711,912
NASSAU	1,422,905
NIAGARA	235,720
ONEIDA	270,051
ONONDAGA	472,105
ORANGE	220,558
ORLEANS	37,305
OSWEGO	100,897
PUTNAM	56,696
RENSSELAER	152,510
ROCKLAND	229,903
SCHOHARIE	24,750
SENECA	35,082
SUFFOLK	1,126,673
TOMPKINS	76,079
ULSTER	141,341
WESTCHESTER	891,604
WYOMING	37,606
TOTAL	8,815,130

FULL TIME CITY HEALTH DEPTS.	
NEW YORK CITY	7,867,760
SCHENECTADY	77,859
TOTAL	7,945,619

DISTRICT OFFICES	
GENEVA	194,831
GLENS FALLS	223,086
HORNELL	99,548
JOHNSTOWN	191,640
MALONE	111,991
MONTICELLO	52,580
ONEONTA	134,035
SARANAC LAKE	83,276
UTICA	329,650
WATERTOWN	112,152
TOTAL	1,533,189

OTHER	
TIOGA COUNTY	46,513

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at least a two-year degree or equivalent college credits. Backgrounds in environmental health or science are desirable at any level.

C. Workforce Projections

The workforce in water supply in New York is expected to double over the next five years. Every area of employment is expected to increase its staffing levels to some extent. This reflects the increase in program activities anticipated once New York assumes primacy for SDWA. Table XI below provides a breakdown of workforce increases based on the estimates of program professionals.

TABLE XI

STATE DEPARTMENT OF HEALTH

Division of Sanitary Engineering
Bureau of Public Water Supply
Workforce Projections to 1982 (est.)

Position	1977	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	49	70	N/A	
Sanitarian	3	17	N/A	
Technician	2	23	N/A	
Other	2	31	N/A	
TOTAL	66	141	N/A	23%

This projected increase in workforce levels will be made possible only through federal funding.

D. Training and Certification

Training for water supply personnel at the state level and for water works operators is provided by the Department of Health, the federal government, and various colleges and universities in the state. Some counties in the state offer training programs with state financial assistance. The Department of Health sponsors an Environmental Health course for Sanitarian and Technician trainees. According to a Department statement, "Continuing training for operators is important to the achievement of the Department's water supply objectives. This effort needs to be considerably expanded in order to attain its potential benefit."

Below is a listing of courses approved by the Department for certification purposes, supplied by the Bureau of Public Water Supply.

COURSES APPROVED BY THE DEPARTMENT FOR CERTIFICATION PURPOSES

Type	Level	No. Courses	No. Operators	Equivalent Trainee-Days
a. By contract with universities:				
Water	Grade II	7	112	1120
Water	Grade III	3	57	285
b. By regulatory agency staff:				
Water	Grade III	7	150	750
c. By other approved agencies and institutions:				
Water	Grade II	1	14	140
d. Totals:				
Water	Grade II	8	126	1260
Water	Grade III	10	207	1035
	TOTAL	18	333	2295

The state encourages operating personnel to attend courses at local colleges and universities, but does not compensate them for their tuition to any extent. Program professionals have expressed a need for tuition support, however. In addition, they were concerned that college courses seem to offer the students less practical application of techniques than in the past. As a result students must apply theoretical techniques to their work, which is not as effective in terms of program operation. These professionals also suggested that students should be exposed to a broader environmental background, and work into a specialization later on. Finally, they expressed some concern over the lack of focus on environmental health training at the federal level.

The federal government should provide training assistance to state and local water supply personnel through the SDWA training grant-in-aid program. Under this a state would apply for a certain amount of training monies to be utilized by employees to attend workshops sponsored by groups such as EPA or the American Water Works Association (AWWA), as well as courses sponsored by local colleges and universities. Certification for state waterworks operators is based on the grade of waterworks plants they are to take charge of.

E. Career Potential

The outlook for career potential in water supply in New York appears promising. New York's decision to assume primacy for SDWA will result in heightened program activities and a need for an increased workforce at all levels. The greatest demand will be for

engineers, (particularly those with degrees in sanitary engineering), sanitarians, and technicians. An increase in federal funding will hasten program expansion, in part, by providing more training programs for water supply personnel. The present annual rate of approximately 225 entry level and 75 upgrade operator trainees is also expected to increase over the next few years.

F. Conclusion

New York has already assumed responsibility for much of its water supply activities, and will assume more under primacy status. State and local workforce levels are expected to increase significantly over the next five years, particularly for engineers, sanitarians, and technicians at the state level as well as treatment plant operators.

Inadequate training programs in water supply exist at the federal, state and local government levels, and new programs are in the process of being developed. In addition, there are a number of schools in the state which offer training in water supply and related fields at the undergraduate and graduate college levels. Overall, the water supply program in New York is making great strides toward assumption of primacy and in providing training for water supply personnel at the state and local levels, but lacks the federal support needed to fully carry out these activities.

V. RADIATION

A. Introduction

The Bureau of Radiation, Office of Environmental Analysis, of the State Department of Environmental Conservation shares responsibility for New York's radiation activities with the Bureau of Radiological Health of the State Department of Health. The New York State Department of Labor also has certain radiation protection activities, as does the New York City Department of Health.

New York has obtained the status of "Agreement-State" with the Nuclear Regulatory Commission (NRC). Section 274 of the Atomic Energy Act authorizes the Commission to enter into agreements with States whereby they assume regulatory authority over radioisotopes, source materials, and special nuclear materials in quantities not sufficient to form a critical mass (a mass capable of supporting a self-sustaining chain reaction). Before concluding an agreement, NRC must find that the State's radiation program is adequate to protect public health and safety and is compatible with that of the NRC. Redeterminations of adequacy and compatibility are made annually by special NRC reviews and exchanges of statistical technical information with each Agreement State.

In addition to preparing states to take on greater responsibilities in controlling radioactive materials, NRC also works to establsh coordination in considering nuclear power plant sites and to maintain open channels of communication to exchange advice and comment on nuclear matters of mutual interest.

New York also participates with NRC in monitoring low-level radioactivity in the environment around nuclear power plants within the state. In the past the state has been under contract with NRC and the Department of Transportation (DOT) to carry on surveillance of shipments of radioactive materials. Specific state statutes authorize New York to assume control over ionizing and non-ionizing radiation and users, empowering the state to grant licenses to dischargers of radioactive waste materials, including those which require underground burial.

There are currently five nuclear generating plants licensed to operate in New York and at least sixteen more in various stages of planning or construction. Table XII, provided by the NCR Annual Report of 1975, presents a brief description of these plants, their status, and scheduled operation dates.

TABLE XII

STATE OF NEW YORK

Nuclear Electric Generating Units in Operation, Under Construction, or Planned

Site	Plant Name	Capacity (Net MWe)	Type	Status	Utility	Scheduled Operation
Indian Point..	Indian Point Station:Unit 1	265	PWR	OL	Consolidated Edison Co.	1962
Indian Point..	Indian Point Station:Unit 2	873	PWR	OL	Consolidated Edison Co.	1973
Indian Point..	Indian Point Station:Unit 3	965	PWR	CP	Consolidated Edison Co.	1975

TABLE XII
(continued)

Site	Plant Name	Capacity (Net MWe)	Type	Status	Utility	Scheduled Operation
Scriba	Nine Mile Point Nuclear Station: Unit 1	610	BWR	OL	Niagara Mohawk Power Co.	1969
Scriba	Nine Mile Point Nuclear Station: Unit 2	1,080	BWR	CP	Niagara Mohawk Power Co.	199?
Ontario....	R.E. Ginna Nuclear Power Plant: Unit 1	490	PWR	OL	Rochester Gas & Elec. Co.	1970
Brookhaven..	Shoreham Nuclear Power Station	819	BWR	CP	Long Island Lighting Co.	1978
Scriba	James A. FitzPatrick Nuclear Power Plant	821	BWR	OL	Power Authority of State of N.Y.	1975
Long Island.	Jamesport: Unit 1	1,150	PWR	UR	Long Island Lighting Co.	1982
Long Island.	Jamesport: Unit 2	1,150	PWR	UR	Long Island Lighting Co.	1984
Somerset....	Unnamed: Unit 1	1,220	BWR	A/O	N.Y. State Elec. & Gas Co.	1984
Somerset....	Unnamed Unit 2	1,220	BWR	A/O	N.Y. State Elec. & Gas Co.	1986
Sterling....	Sterling Power Project:Unit 1	1,150	PWR	UR	Rochester Gas & Elec. Co.	1982
*	Greene County Nuclear Power lant	1,191	PWR	A/O	Power Authority of State of N.Y.	1983
*	Mid-Hudson East 1	1,300	-	A/O	Empire State Power Resources	1987
*	Mid-Hudson East 2	1,300	-	A/O	Empire State Power Resources	1989

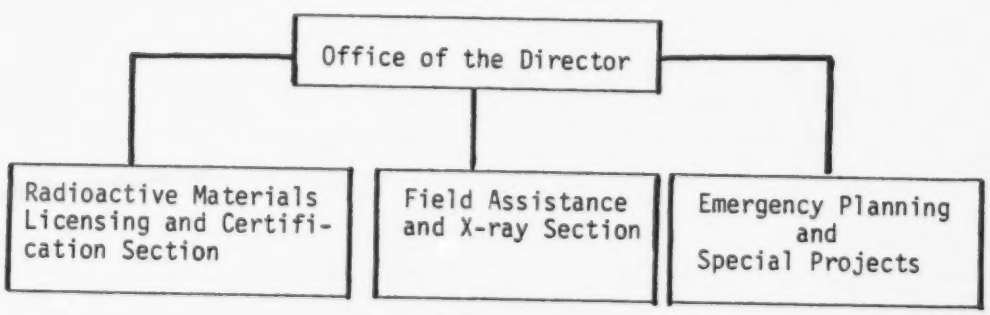
TABLE XII (continued)

Site	Plant Name	Capacity (Net MWe)	Type	Status	Utility	Scheduled Operation
*	Mid-Hudson West 1	1,300	-	A/O	Empire State Power Resources	1990
*	Shoreham West 1	1,300	-	A/O	Empire State Power Resources	1987
*	Shoreham West 2	1,300	-	A/O	Empire State Power Resources	1989
*	St. Lawrence 1	1,300	-	A/O	Empire State Power Resources	1988
*	St. Lawrence 2	1,300	-	A/O	Empire State Power Resources	1990

* site not selected
UR - Under Review
OL - Operating License
CP - Construction Permit
A/O - Announced/ordered

B. Workforce Profile

The Bureau of Radiological Health of the State Department of Health has the following organizational structure.


Office of the Director
Radioactive Materials Licensing and Certification Section
Field Assistance and X-ray Section
Emergency Planning and Special Projects

The Radioactive Materials Licensing and Certification Section directs programs for licensure and inspection of agreement material and registration of non-agreement material used in medical and educational facilities and radioactivity incorporated into consumer products.

The Field Assistance and X-ray Section directs programs for inspection of radiation equipment, exclusive of particle accelerators; evaluates staff in full-time local health departments participating in radiological health; and directs programs for registration of radiation installations using X-ray equipment particle accelerators, laser equipment and upon request reviews plans for new installations.

The Emergency Planning and Special Projects Section maintains the statewide radiation emergency plan and evaluates consequences of accidents at nuclear facilities; advises on procedures and shielding at particle accelerator installations; and assists on projects involving ionizing and non-ionizing radiation.

There are approximately 19 people currently employed in radiation at the state level, including the Department of Environmental Conservation and the State Department of Health. Seven are engineers; most with backgrounds in health physics or nuclear experience, three of whom are located in the Health Department; one is a technician, and eleven others serve in various capacities such as radiological health specialists. At least eight of these are located within the Department of Health. The program has lost some personnel over the past two years. The following table reports on the current staffing level by position.

TABLE XIII

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Office of Environmental Analysis
Bureau of Radiation
Current (1976) Staffing Level

Position	1976
Engineer	7
Technician	1
Other	11
TOTAL	19

C. Workforce Projections

Growth in the radiation program in the state will occur principally in three areas, nuclear power, radioactive waste disposal, and control of radiation from naturally-occurring sources. At the state level, workforce levels are expected to remain constant over the next five years, as illustrated in Table XIV below.

TABLE XIV

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Office of Environmental Analysis
Bureau of Radiation
Workforce Projections to 1982 (est.)

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	7	7	7	7	7	7	N/A	0%
Technician	1	1	1	1	1	1	N/A	0%
Other	11	11	11	11	11	11	N/A	0%
TOTAL	19	19	19	19	19	19	N/A	0%

D. Training and Certification

For the most part, state radiation employees attend training courses sponsored by the federal government. NRC conducts training programs for state personnel to assist states in preparing for agreement state status and to help existing agreement states train new radiation control staff. EPA's Office of Radiation Programs offers one course for professionals. This is an interagency course on emergency response planning conducted at the Defense Civil Preparedness Agency Staff College in Battle Creek, Michigan, and coordinated by the Nuclear Regulatory Commission (NRC). In addition to this course, EPA offers a variety of films and self-instructional materials to state and local governments on the transportation of radioactive materials.

E. Career Potential

The potential for careers in radiation in New York will depend at least partially on the future of nuclear power facilities in the state. At the current rate of planning and construction, these power plants can be expected to provide a large number of jobs for nucelar engineers, scientists and technicians. The development of nuclear power will also affect the number of jobs available in radioactive waste disposal, since much of this waste in the future will be generated by nuclear facilities. Most of these jobs will be created in private industry.

F. Conclusion

Expansion of radiation control activities in New York is inevitable. Operation and construction of nuclear generating facilities in the state will produce a need for trained professionals in the areas of nuclear power and radiocactive waste disposal. Adoption of standards for the control of naturally occuring radiation at the federal level is likely to have an impact on state radiation activities. Heightening of program activities in all areas of radiation control will result in an increase in manpower in both the public and private sectors.

VI. SOLID WASTE

A. Introduction

The state of New York has been involved in solid waste management activities for over a dozen years. Prior to 1970 the program focused primarily on the control of refuse disposal, but the current direction is toward establishment of environmentally sound waste management practices by municipal and private corporations with optimum recovery and reuse of resources. The state program has three specific objectives:

1. Achieve and maintain effective disposal of all solid wastes
2. Achieve and maintain efficient management of all solid wastes.
3. Achieve optimum utilization of resources through recovery, recycling, and reuse techniques and applicable source reduction methods.

Until 1970, the solid waste program was located in the State Health Department. With the creation of the Department of Environmental Conservation, (DEC) the program was transferred to the new Department and became the Bureau of Solid Waste Engineering. In 1973, the program's status was upgraded and it became the Division of Solid Waste Management.

The state program emphasizes the development of local and regional solid waste management systems. The state has provided assistance to approximately forty counties and the City of New York in developing such systems and it is estimated that this covers 92 percent of the state's population. Indications are that approximately 53 percent of the more than 1,500 municipalities in New York will be served by some form of intergovernmental or multi-municipal system.

Disposal is a major problem in the New York City metropolitan area. It is estimated that this region, which includes some New Jersey counties,

produces 700 tons of sewage sludge per day. Eighty percent of this is barged to sea while the remainder is landfilled, incinerated, or disposed of by other means. Studies done for the Interstate Sanitation Commission in 1975 and 1976 recommended pyrolysis as a solution for most of the sludge. In outlying areas of the region, sludge could be applied to the land as soil conditioner. It is dangerous to dispose of all sludge in this manner because of the content of toxic ingredients, which could contaminate foodstuffs and groundwater. The studies concluded that a combination of disposal methods, including pyrolysis, land application, composting, landfilling and ocean disposal, would be necessary to control sludge in the New York City metropolitan area.

Landfills are the most widely used form of solid waste disposal in the state. In 1963 when State Sanitary Code Regulations became effective, there were about 1700 open dumps in New York. Enforcement of standards resulted in the closure of most of these and currently there are 646 sanitary landfills throughout the state. Of this number, 519 or 80 percent are publicly owned and operated and 127 or 20 percent are privately owned and operated.

Resource recovery activities, until 1972, were limited to the promotion of resource recovery practices and the evaluation of this technology. In 1972 the legislature passed the Environmental Quality Bond Act which provided $175 million for resource recovery and disposal projects. It authorized construction grants to municipal corporations for up to 50 percent of the cost of resource recovery projects and up to 25 percent of the cost of equipment for disposal projects. Currently the state has two resource recovery facilities in operation, three more under construction,

and four in advanced planning stages. Further information on these facilities is contained in Table XVI. Additionally, there are six communities in New York which have commissioned feasibility studies for resource recovery facilities. There are also 33 communities within the state which have facilities for separate collection of recyclable materials.

B. Workforce Profile

Information for this section was obtained primarily from on-site interviews with professionals working in the program. The staffing levels apply to persons working in the Division of Solid Waste Management.

New York's Solid Waste Management Division has a current staffing level of 51 people. A majority of these are engineers as indicated in Table XV below. The engineers have educational backgrounds in a variety of engineering disciplines since job qualifications do not stipulate any particular engineering degrees required. Program officials indicated that persons with different backgrounds are desired and that differing backgrounds are applicable to the various functions of the Division. For example, civil, soils, and environmental engineers are sought for landfill operations, chemical, soils, and mechanical engineers for resource recovery. For this reason, the Division employs engineers of several educational backgrounds.

In addition to the engineers, the Division has 3 specialists, 5 technicians, and 10 classified as "other" who are administrative or clerical personnel. Those classified as specialists are a landscape architect, an economist, and a resource recovery marketing specialist.

TABLE XV

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Solid Waste Management
Current (1977) Staffing Level

POSITION	1976
Engineer	28
Technician	3
Scientist	3
Other	12
TOTAL	46

Additional workforce in solid waste exists at the community level in landfill operations and waste collection and in the private sector in landfill operations, collection, and resource recovery. Because these activities are operated locally and independent of one another, no readily available staffing configuration exists. Officials in the Division of Solid Waste Management have indicated, however, that more than 3,000 have attended Department-sponsored training courses on waste management practices.

C. Workforce Projections

Data contained in this section are based on the best professional judgement of professionals working in the program and planning materials they were able to supply.

Within the Division of Solid Waste Management, officials estimate that the workforce may double within the next five years although meaningful projections are difficult to make. The primary reasons for this growth are the expanded efforts of the federal government in solid waste management and an increasing emphasis on resource recovery and hazardous waste disposal. The Division expects to get additional personnel as a result of passage of the Resource Conservation and Recovery Act and projections are based on this expectation, although the exact numbers and occupational categories of persons to be employed as a result of this Act are not known. Professionals indicate that the types of scientists and engineers, by training, required in the future will be the same as current requirements. That is, geologists, chemical, environmental, civil, mechanical, and soils engineers will be in demand.

TABLE XVI

RESOURCE RECOVERY FACILITIES IN NEW YORK THAT ARE IN OPERATION, UNDER CONSTRUCTION, OR IN ADVANCED PLANNING STAGES

Location	Project Type	Capacity	Products/ Market	Method of Financing	Operational Date	Status
Albany	Refuse-derived fuel	600 tons/day	RDF/Heating and cooling for State Office of General Services	50% State Bonds 50% Municipal General Obligation Bonds	1979	Design study now underway
Chemung County	Refuse-derived fuel	33 tons/day	RDF	N/A	N/A	County is negotiating for solid waste to satisfy potential market demands
Hempstead	Wet-pulping of waste for materials and RFP preparation	2000 tons/ day	RDF, aluminum, glass, electricity	Corporate equity and Industrial Revenue Bonds	N/A	Ground breaking took place in May 1976
Merrick	Refractory incinerator with heat recovery	600 tons/day	Electricity	N/A	1952	Electricity is used within the facility for lighting and equipment operation
Monroe County	Refuse-derived fuel	2000 tons/ day	RDF in Rochester Gas & Electric Co.	Public Improvement loans and state financing	1978	Under construction
Oceanside	Refractory wall incinerator/ Waterwall combustion	750 tons/day	Steam	N/A	1965	N/A
Onondaga County	Waterwall incineration	1000 tons/ day	Steam/Heating and cooling	Municipal Bonds, state grant	N/A	Design study underway
Smithtown	Materials recovery	1000 tons/ day	Paper/metals	50% state funding 50% N/A	1977	Construction underway
Westchester County (2 projects)	1.Pyrolysis 2.Undetermined	2300 tons/ day	Gas or steam/ heating & cooling	Bonds/State Financing	1st: 1980 2nd: N/A	Still in planning stages

Turnover among personnel in the program is extremely low. Salaries in New York State are generally higher than in neighboring states and comparable to those paid by the federal government.

Local and private sector workforce projections are difficult to obtain for much the same reasons that were discussed in the workforce profile section. The fact that local jurisdictions and industry operate independently of one another makes it virtually impossible to get an accurate projection. State officials did indicate, however, that they expect the number of sanitary landfills in the state to be reduced to about 300 in 1982, thereby reducing the need for operators and other landfill personnel. It is expected that resource recovery will have replaced the need for landfills in many places by that time.

D. Training and Certification

The Department's Office of Manpower Development and Training has been a source of major support for the Division of Solid Waste Management's Training programs. This training is provided for both in-house personnel and local officials and personnel. As previously mentioned, it is estimated that 3,000 local operators have been trained in New York. In 1975, the Manpower Office participated in several solid waste training programs. Training programs for solid waste management facility operators were conducted by the Division of Solid Waste Management and this Office. In addition, according to the 1976 Annual Report of the Office of Manpower Development and Training, the following activities took place.

Solid Waste Management Training

By contract with Hofstra University the following training was provided to State and local regulatory agency and operating agency personnel.

Course Title	Times Conducted	Attendees	Trainee-days
Incinerator Technology I	1	16	80
Incinerator Technology II	2	22	110
		38	190

Arrangements were made for an Assistant Engineer from the Division of Solid Waste Management to attend a special instructor and instructional materials development program at Utah State University.

The Division of Solid Waste Management also provides an informal on-the-job training program to new personnel to familiarize them with the state solid waste law and regulations and the operating procedures of the Department.

Potential for future solid waste training activities exists under the recently enacted Resource Conservation and Recovery Act. The Act authorizes EPA to enter into grants or contracts for the development and implementation of programs to train individuals for occupations in solid waste management. It also authorizes funding for training instructors and supervisory personnel for the instruction and supervision of persons involved in the design, operation, and maintenance of solid waste disposal and resource recovery equipment and facilities. It is anticipated that this federal funding will serve to supplement and increase the state's current training programs.

E. Career Potential

Potentials for careers in solid waste management in New York appears promising. The increased federal commitment to solid waste

management through the Resource Conservation and Recovery Act and the number of resource recovery facilities coming into operation over the next several years is indicative of the growth that can be expected in this field.

The careers will tend to move away from the conventional landfill and incinerator operators to more highly trained individuals for resource recovery and hazardous wastes treatment and disposal operations. The opportunities will exist for engineers and scientists in the planning, design, and operation of these facilities. Although the demand for landfill operators is expected to decline, a certain number of these positions will continue to exist in the foreseeable future since resource recovery is not practical in many smaller communities and rural areas.

F. Conclusion

New York's solid waste management program seeks to establish environmentally sound waste management practices and the optimum recovery and reuse of resources. Landfills are the most common form of waste disposal currently used, but the number of landfills is expected to decrease significantly over the next five years as additional resource recovery facilities are constructed and as additional reorganization of disposal operations is realized.

Fifty-one people are currently employed in the state program with thousands more in local governments and private industry. Engineers are most widely utilized for this program and this is expected to continue in the future. The increased emphasis on resource recovery

indicates that future careers in solid waste management will, to a large extent, require professionally trained persons.

VII. WASTEWATER

A. Introduction

Responsibility for the wastewater program in New York rests with the Division of Pure Waters of the Department of Environmental Conservation. The primary objectives of the program are to:

1. Set standards consistent with Federal and State laws and regulations for surface and groundwater and the discharge of municipal sewage and industrial wastes into the waters of the State.

2. Reduce the discharge of pollutants into the State's waters by providing financial and technical assistance to local governments for the construction and operation of modern, efficient sewage treatment facilities.

3. Require municipal, industrial and other polluters to reduce discharges and maintain efficient levels within acceptable limits through programs of permit issuance, monitoring, and enforcement.

4. Conduct research aimed at developing new methods of reducing and controlling water pollution.

EPA has delegated to New York State the responsibilities for administering portions of the municipal construction grants and the NPDES permit programs.

B. Workforce Profile

Data for this section was compiled through on-site interviews with professionals working in the wastewater program and by the use of various planning documents, studies and reports supplied by them.

A description of activities performed by the Division of Pure Waters in carrying out the mandates of the Federal Water Pollution Control Act Amendments (FWPCA) of 1972 is excerpted, in part, from the New York State Program for the Control and Abatement of Water Pollution, Fiscal Year 1977.

1) Municipal Construction: Under programs prior to the enactment of FWPCA, the state completed 314 projects, with 204 projects remaining in various stages of activity. It is New York's policy to complete all prior projects as soon as possible. With regard to the program under under FWPCA the state is studying ways to accelerate the grant program and is rescheduling some of the projects of New York City which is currently unable to afford the municipal share of the program.

2) Water Quality Permits, Compliance Monitoring, and Enforcement: Since the start of the national program in late 1972, EPA has issued some 1,250 permits for New York, of which some 600 cover major discharges.

The State SPDES permit program, since its inception in September of 1973, has yielded 2,566 issued permits, some 2,000 of which are for groundwater discharges required by State law but not required by Federal law.

It is expected that during the last quarter of FY '76 (April 1 to June 30, 1976) and the "transitional" quarter of July 1 to September 30, 1976, the majority of remaining major discharges will be permitted. The "in Pipeline" minor permits initiated by EPA should be issued during the July-September and October-December quarters. At the same time the processing of the 289 permits that are scheduled to expire July 1, 1977, will be initiated in the DEC regional offices with the workloan equally divided between the July and October quarters. These will be processed through the program units and Bureau of Standards and Compliance. All should be reissued during the January and April 1977 quarters. 160 of these 289 are major discharges.

Untouched industrial type applications, about 100, will be processed by the Bureau of Industrial Programs with a projection of some 50 of these actually being issued as permits during the July '77 quarter. In addition, about 20 permit applications per month are expected to be received and processed.

During FY '77 the Department will maintain primary responsibility for compliance monitoring on SPDES permits and turned-over NPDES permits. To date DEC has requested that about 100 of NPDES permits be turned over for total management which includes modification and enforcement.

It is expected that an electronic data processing (EDP) system will be a major mechanism to enable DEC to monitor permit compliance properly. EPA is using their own EDP system in connection with the NPDES permits, while DEC is presently using a manual system to monitor compliance with the SPDES permits. Conversion to the EDP system is expected within the next three months. There will be a residual number of minor SPDES permits which will still be monitored by the manual system.

The Bureau of Industrial Programs will maintain the primary responsibility for review and approval of all industrial facilities submissions providing for input from the regional offices.

The Bureau of Industrial Programs will review approximately 250 engineering reports and/or final plan submissions concerning new treatment facilities, modifications to existing facilities and/or plant expansions in FY '77. This is a major portion of this Bureau's workload and constitutes about 60% of its efforts. It is expected that this extent of submissions will result in approximately 80 final approvals for construction.

The primary DEC review responsibility for municipal/sewage type submissions will rest with regional offices and the Bureau of Sewage Programs.

3) Water Quality Management Planning/Water Quality Standards: New York State water quality standards and use classifications have been approved by the USEPA, Region II and the state is reviewing all stream classifications in view of the revised water quality standards and other changes in water use that may affect the present classifications. A program was begun in fiscal year 1975 and will continue for the next several years.

4) Anti-Degradation: A non-degradation policy was adopted by the State in May 1970, and was approved by the FWPCA, Department of the Interior, in March 1971. This same statement was filed with NYS's water quality standards under PL 92-500 and subsequently the package was approved by U.S. EPA on March 27, 1974.

The anti-degradation statement was required by the Department of the Interior as a prerequisite to approval of State water quality standards.

In addition to the policy statement, antidegradation is implemented through a series of general and special laws (such as Article XIV of the State Constitution enacted in 1895) for maintaining the Forest Preserve as forever wild; the Wild, Scenic and Recreational Rivers System added to the Environmental Conservation Law by Chapter 869, Laws of 1972; Title 17 of the Environmental Conservation Law specifically prohibiting discharges into certain named rivers, streams and lakes; stream classifications AA special and N where no discharges are allowed, and the formation of Agricultural Districts to preserve land for agriculture use in accordance with the Laws of 1971. In addition, the NPDES process serves the intended function of preventing degradation.

Those waters protected for trout spawning purposes require compliance with extremely high water quality standards approaching, if not surpassing, the level of water quality generally associated with the antidegradation statement.

Because high quality waters are already protected by the statutes and regulations mentioned above, the antidegradation statement has had a neutral effect in that it has neither promoted or hindered the state's water quality program. Waste effluent discharges are determined on the basis of improbable combinations of adverse factors, i.e., a 25 year projected waste flow combined with drought flow, high temperature conditions and reserve assimilative capacities. Through these combinations of laws and limiting design, antidegradation of New York's waters is assured.

5) Basin Plans (Phase I): The department will continue to develop Phase I Basin Water Quality Management Plans for the remaining areas of the State utilizing, as major elements, existing comprehensive studies, 201 Facility Plans, results of Water Quality Surveys, and data developed from processing and certification of discharge permits. These plans identify pollution problems, treatment needs, priorities, schedules for pollution abatement and govern state and federal grants and aid for any treatment works and all permits issued. The plan also provides future management guidance for the allocation of waste loads and other management factors on a basin basis.

6) Areawide Waste Treatment Management Planning: The State expects to utilize several State and Federal planning program elements to best provide the waste treatment planning needed under the variety of circumstances which are found in New York.

The Department is providing necessary direction, guidance, and assistance to the designated planning agencies to ensure satisfactory plan development, review, coordination, certification, and implementation. In order to administer this responsibility, the Department has assigned a full-time Field and a Central Office Senior Sanitary Engineer to each of the designated areas and agencies.

7) Water Resources Planning: The Department will continue its water resources planning program. These studies will provide guidance for multi-purpose management of the State's water resources. Plans for the Erie-Niagara, St. Lawrence, and Oswego River Basins have been completed and approved. The Department has held public hearings on Board plans for the Black and Chemung River Basins and is now preparing a decision on their approval. Plans have been submitted to the Department for hearing and approval for the Eastern Susquehanna and Allegheny River Basins. Plans for the Upper Delaware and Genesee River Basins are expected to be submitted to the Department for hearings and approval in Federal FY 1976.

8) Non-Point Source Control Program: New York State's non-point source control strategy will be developed primarily through the Section 208 Areawide Waste Treatment Planning process, which will include planning in six designated areas as well as a Statewide effort to cover the remainder of the State and integrate the Statewide related aspects of planning done by the six designated agencies.

On a Statewide basis, an initial element of the planning process for non-point source control will be a better delineation of the nature and extent of non-point related land uses and activities in the State and the extent to which they may be related to water quality problems.

A principal objective of New York State's non-point source planning activities to be carried out under Section 208 will be to inventory and analyze the existing structure and practices and recommend ways in which existing institutions and functions may be modified or adapted to better meet water quality needs.

Another factor to be considered in New York State's non-point strategy is that through the Environmental Quality Research Unit within DEC, Cornell University, and a number of other universities within the State, there is a significant amount of research currently being conducted within

the State on questions related directly to non-point source control. Major areas of investigation include lake eutrophication; the relationships between various types of land uses and water quality; and the relationships of agricultural practices to water quality. The Department, through the Section 208 planning process, intends to monitor this research and make the best possible use of it as regards the development of appropriate non-point control practices and strategies. The Department intends to cooperate with the six designated agencies in the coordination of activities and the sharing of relevant information and analyses.

9) Monitoring: Pollutant source monitoring, particularly toxic substance dischargers, will be intensified this year commensurate with the emphasis to be placed on the ambient monitoring counterpart. It is expected that compliance sampling efforts will be directed primarily to this category of dischargers which number some 276 sources. The Data Quality Assurance Program will be at full force to provide the overview needed for the potentially overwhelming amount of data being generated. Routine water quality surveillance will continue at the streamlined level of last year while planning inputs are destined to continue at a relatively low priority.

10) Municipal Operations: The program for operation and maintenance inspections will be accelerated as new plants come on line and the need increases for assistance to municipalities in start-up, checking and control operations (including verification of laboratory work) and education with respect to the performance standards and requirements of the Pollutant Discharge Elimination Systems Permits.

11) Oil and Hazardous Spills Control: During the last calendar year there were 1,030 spills in the State of New York of which about twenty per cent were hazardous materials other than oil. This is an average of 85 spills per month. The spills come from a variety of sources: vessels, barges, trucks and on-shore facilities, practically all of which are engaged in the interstate commerce.

There is no pattern nor trend to such spills which, almost without exception, are due to carelessness, lack of proper maintenance of vessels or facilities, or mistakes in human judgement.

12) Ocean Dumping: While this function is largely limited to EPA Region II, the Department has considerable interest in this matter. A statement was presented at the March, 1976 hearings in support of the EPA draft Environmental Impact Statement recommending continuation of sewage sludge disposal at sea until 1981. The Department is also participating in the study of alternatives to ocean dumping of sewage sludge that is being conducted under the direction of the Interstate Sanitation Commission.

13) Dredged or Fill Material, Discharge Permits: The U.S. Army Corps of Engineers requires that a water quality certification from the State issued under Section 401 of P.L. 92-500, is obtained before the discharge is commenced unless the State has waived its right to so certify. Corps of Engineers permits will not be issued where the State has denied certification or authorization.

Normally the Department of Environmental Conservation:

-Issues 2400 permits per year for activities on 200,000 miles of stream and 4000 lakes, about 10% of which involve dredging. Staff requirement is 25 men per year.

-Issues 200 tidal wetlands permits per year plus 1300 "letters of permission." This program covers 43 square miles of wetland.

-Issues permits for activities on freshwater wetlands. This program involves 2050 square miles and covers any activities thereon under a permit program. Annual output data are not available.

The current level of activity in water pollution control at the state level requires approximately 414 person-years. This is supplied from a variety of sources within the Department, primarily from the Division of Pure Waters. The majority of the personnel within the Division are engineers (227). These persons are required to have four-year degrees in one of the engineering sciences. A number of the engineers have training as sanitary or chemical engineers. The program also uses the services of 67 technicians (positions which do not

require a college degree), and 13 scientists with professional training in this field. Those listed as "Other" include administrative and clerical personnel.

TABLE XVII

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Pure Waters

Current (1976) Staffing Level*

Position	1976
Engineer	227
Scientist	13
Technician	67
Other	107
TOTAL	414

*This Table represents persons within the Department from several Divisions whcih are involved in water pollution control, such as the Division of Fish & Wildlife as well as the Division of Pure Waters, which has approximately 275 total personnel.

Current estimates indicate that there are 1,107 certified municipal waste treatment plant operators in New York. The Department of Environmental Conservation's Office of Environmental Manpower completed a comprehensive manpower study for municipal wastewater treatment plants in 1974, and program officials consider much of the data contained in the study to still be valid. The following numbers and types of facilities in New York were reported in the study.

Total Number of Wastewater Treatment Plants				
Municipal	Industrial	Federal	State	Non-Municipal Commercial
509	506	50	60	200

Municipal plants are sewage treatment plants owned and operated by a city, town, village, county, joint sewer board, or other political subdivision serving the residents of the area. Private sewage disposal corporations are included in this figure. Certified operators are required to be responsible at all such installations.

Industrial plants include all types of wastewater treatment; if domestic wastes are mixed with that wastewater, a certified operator is required.

Certified operators are required at state operated sewage treatment plants but not a federal institutions.

This study surveyed 403 municipal plants, excluding 72 that are privately operated or abandoned and 13 plants located in New York City. A total of 1,992 persons were working at the plants; 1,107 of these were operators. Operators represented more than 55% of the total treatment plant staff, with laborers comprising 35% of this total.

C. Workforce Projections

Information for this section was obtained through on-site interviews with professionals working in the wastewater program and represents the best professional judgements of those persons.

Department personnel active in water pollution control are projected to increase at a rate of about 4% per year over the next five years. This would increase the level from the current 414 to a total of 505, an increase of 91 persons. The proportion within the Division of Pure Waters (66%) should remain roughly constant. As indicated in Table XVIII, engineers will continue to be most numerous, although the greatest percentage increase is anticipated in the scientist category. It is expected that educational requirements for these positions will remain the same as current requirements.

TABLE XVIII

DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Pure Waters
Workforce Projections to 1982 (est.)*

Position	1976	1977	1978	1979	1980	1981	%/annum turnover (average)	%/annum growth (average)
Engineer	227	231	236	240	245	250		2%
Scientist	13	17	21	25	30	35		22%
Technician	67	71	76	80	85	90		6%
Other	107	110	115	120	125	130		4%
TOTAL	414	429	448	465	485	505		4%

*This Table represent persons within the Department from several Divisions which are involved in water pollution control, such as the Division of Pure Waters and the Division of Fish & Wildlife.

A significant increase in the number of wastewater treatment plant operators and other personnel is anticipated. The 1974 study mentioned in the previous section projected future workforce requirements for the 403 municipal plants surveyed and reported the information contained in the chart following this section.

With regard to this chart, the study made the following comments. "The important point to remember is that the figures here are not for total demand in New York State, but only for the municipal sewage treatment field excluding New York City. Although it is very difficult to make an accurate determination now of overall demand, it is estimated that the total demand figures in the chart represent approximately 75% to 85% of the demand for all sewage treatment plant operators in all fields in the State."

"The expected net total actual operators for the years 1974 to 1983 is the cummulative result of adding the total demand for oper-

ators each year due to new construction and replacement to the total for the year earlier. The ratio of total actual personnel to the actual number of operators for 1973 was multiplied by the expected net total actual operators for the years 1974 through 1983 to obtain the expected total actual personnel for those years."

D. Training and Certification

Training in the wastewater program in New York is the responsibility of DEC's Office of Environmental Manpower. Numerous training programs and courses are conducted each year for Department personnel and wastewater plant operations. A brief description of training activities covers the 1975 calendar year as an example, is extracted below from the 1975 Office of Environmental Manpower Annual Report.

Wastewater and Water Treatment Plant Operator Training:

Operators of public sewage treatment plants are required to meet prescribed qualifications. Among these qualifications is successful completion of a special course. These courses are developed, administered, conducted, reviewed and/or approved by the Office. Comparable regulations of the Health Department necessitate similar courses for water treatment plants.

Of particular significance is the development and conduct of the first Grade I Wastewater Treatment Plant Operator's Course. The increasing numbers of Grade I applicants has led to the requirement for a Grade I course as a prerequisite to certification effective April 1, 1976.

Continuing training needs must be considerably expanded in order to attain its potential benefit. Evaluation of the Department's operator training efforts and identification of existing deficiencies led to the development of a proposal for a comprehensive operator training and development system.

For the past several years, a federal grant has funded a program wherein an engineer has tutored operators through a

Field Study Training program offered by California State University at Sacramento. Known as the Itinerant Instructor program, this has become an important element of operator training. A special grant from the State Labor Department under the Comprehensive Employment and Training Act is funding a similar program, begun in late November, for CETA-eligible, entry-level operators.

One in-service course of special importance during 1975 was the course in Activated Sludge Process Control. Selected operators and Department engineers were given intensive operational control training at a treatment facility by a team of nationally-known experts from the U.S. EPA. This was the first example of such a program anywhere in the nation.

Wastewater Treatment Plant Operator Certification:

During 1975, 342 applications for approval of qualifications were received in the Office. A total of 313 were approved. It should be pointed out that a substantial degree of preliminary screening takes place at local Health Departments and Regional Offices of DEC, thus eliminating many obviously unqualified applicants.

An advisory committee consisting of certified operators and sanitary engineers reviewed Department rules, regulations, policies and procedures governing the qualifications of operators during 1975. The committee then made recommendations regarding modifications for consideration of this Office and the Division of Pure Waters.

The Department became a member of the Association of Boards of Certification during 1975. This organization is devoted to the improvement of State operator certification programs. It is anticipated that membership will be particularly beneficial to the Department in assuring that certification requirements and examinations meet Equal Employment Opportunity Commission requirements. The Office has assumed an active role in several important ABC projects.

A number of operator training activities were conducted by the Office of Environmental Manpower in FY 1977. Following the State's annual water quality program plan for FY 77, activities included:

1. Operator Entry Level Training

   a) Classroom Training

      Over 200 entry-level operators of wastewater treatment operations trained at seventeen certification courses of one to three weeks duration.

   b) Field Study

      Approximately 100 operators directed through a field training program by an "itinerant instructor". This instruction was built on a correspondence course by direct visitation with the student by the instructor, formal course-related seminars, and continuous availability by the instructor to the students by means of a toll free telephone number.

   c) Comprehensive Employment and Training Act Program

      Under this program, about 85 operators received intensive classroom and on-the-job training similar to, but more more individually structured, than the Field Study element identified above. This is an excellent example of the use of the use of new institutional arrangements. The social operation of CETA has been effectively blended with the mission of water pollution control.

2. Operator Upgrade Training

   Approximately 190 operators trained at eight upgrade courses of one week duration.

3. Long-Range Programs Whose Development and/or Implementation Commenced in FY 1977

   a) Field testing and partial implementation of the EDP element of "Project Aim" to identify operator development needs.

   b) Demonstration of the effectiveness of a State educational assistance capability.

   c) Formal application for a construction grant for an operator training facility as authorized under Section 109(b) of PL 92-500 is planned.

   d) Major revision of the State Operator Mandatory Certification Program, including possible continuing education requirements, are under study.

4. Academic Programs

a) The Department will continue to cooperate with a number of community colleges and universities within the State which are providing training in all aspects of water pollution control, including operators,

b) Conduct of a demonstration project at Ulster County Community College, with EPA financial support, (for the preparation of individuals to function in the water quality monitoring program) will continue. Coordinated by this Departmentm the program will include a "reach-out" program of local training in sophisticated laboratory skills by a qualified chemist.

5. Other

a) Development and distribution of technical newspapers.

b) Direct conduct of operator seminars and workshops along with encouragement and assistance to professional and private groups in similar endeavors.

c) Instruction of Department engineers in operational aspects of water pollution control.

d) Individual training and assistance by Department engineers at plants.

e) Individual instruction of operators at their plants by State Chemists.

It should be pointed out that federal support of workforce development programs has been commendable, but has not begun to keep pace with the needs generated by PL 92-500.

E. Career Potential

The outlook for future careers in the wastewater program in New York appears good, based on projections of professionals working in the program. Annual growth will be approximately 4% for professionals with training as engineers, particularly sanitary and and chemical engineers, and chemists. Potential will also exist for persons with technical skills who do not have college degrees.

A significant potential for trained treatment plant operators is also anticipated by program officials. The demand in this area is expected to increase by over one-third again as many as are currently employed, over the next five years.

F. Conclusion

New York's wastewater program is administered by the Department of Environmental Conservation with a current staff of 414 persons. Projections indicate a 4% increase in personnel per year over the next five years is necessary for most effective implementation of the program.

Through the Office of Environmental Manpower, a comprehensive training program is provided for program personnel and treatment plant operators. Considerable career opportunity is expected to exist for trained operators as well as for engineers, chemists, and technicians.

NEW YORK STATE MUNICIPAL WASTEWATER TREATMENT PLANTS

FUTURE WORKFORCE REGUIREMENTS*

Figure 6

YEAR	DEMAND FOR OPERATORS				EXPECTED NET TOTAL ACTUAL OPERATORS	EXPECTED TOTAL ACTUAL PERSONNEL
	NEW CONSTRUCTION**		***REPLACEMENT OF TERMINATED I,II,III	TOTAL		
	GRADE II,III	GRADE I				
73					1107	1992
74	62	6	70	138	1175	2120
75	62	6	74	142	1243	2240
76	62	6	78	146	1311	2360
77	62	6	83	151	1379	2480
78	89	4	87	180	1472	2650
79	89	4	93	186	1565	2800
80	89	4	99	192	1658	2980
81	89	4	105	198	1751	3160
82	89	4	110	203	1844	3320
83	89	4	116	209	1937	3500
TOTAL INCREASE	782	48	915	1745	830	1508
AVERAGE INCREASE PER/YEAR	78	5	92	175	83	151

* Excluding New York City

** Based upon equal annual disbursements of $500 million in Federal funds. Deductions were made for monies allocated to New York City A direct proportional change in operator demand will result from changes in the actual level of allocations.

*** Determined by applying termination rate of 6.3% to year earlier total actual operators.

VIII. ENERGY

In 1975 the New York State Atomic and Space Development Authority was restructured and renamed the Energy Research and Development Authority. The previous mandate which emphasized nuclear development and space activities was altered to place the primary focus on the development of alternative sources of high yield, low cost energy.

Projects are selected and developed with the aid of the Authority's Research Committee. The Committee is presently composed of the Chairman of the Public Service Commission and representatives of the State's business and academic communities who are experts in the field of energy research.

From 1972 until it was restructured in 1975, the Atomic and Space Development Authority conducted research projects that emphasized aspects of electric power supply relevant to environmental protection. The program was initiated in 1972 with an initial appropriation of $500,000 and in subsequent years was supported with a total of $5,890,000 in additional appropriations.

Major programs have included:

1. Electric Supply and Demand for New York: a comprehensive assessment of the influence of technological, environmental, societal, and economic factors upon New York's electric power supply through the year 2000. Consideration of a broad range of energy alternatives including wind and solar and an identification of the policy and planning alternatives, including preparation of a computer model of New York's electric energy system.

2. Laser-Induced Fusion for Power Generation: experimental research exploring the feasibility of using a powerful laser system to achieve the extremely high temperatures at which fusion energy release is initiated.

3. Advanced Technologies for Power Transmission: full scale testing of a compact above-ground power transmission line offering environmental and aesthetic advantages and testing of high capacity, force-cooled underground transmission cables to improve the economics and reliability of such transmission systems.

4. Beneficial Uses of Power Plant Heat: engineering studies cosponsored with the Federal government on a multi-purpose concept in which power generation facilities are integrated with wastewater treatment facilities, using power plant heat to achieve high levels of wastewater treatment and recycle to augment water resources.

5. Oceanographic Studies: research on the physical and biological environment in New York's offshore waters to assess the environmental implications of the offshore siting of electric generation facilities.

6. Power Plant Thermal Discharge Effects: a statewide research project utilizing airborne infrared temperature sensing techniques to map water temperature changes in the vacinity of electric power generating facilities.

7. Spray Pond Cooling of Electric Generating Facilities: research and testing of full-scale sprays to explore the effectiveness and environmental suitability under New York conditions of this alternative to power plant thermal discharges to watercourses.

8. Aquatic Environmental Simulator: design of a device for the on-site simulation of the conditions experienced by aquatic micro-organisms entrained in a power plant cooling system for use in research on the location and design of such systems.

9. Seismic Stability Studies: borings, geologic mapping, sonic reflection surveys, microseismic monitoring and roch stress analysis to document the seismic stability of northern New York and relatedly, its suitability as the location for major electric generating facilities.

10. Solid Low-Level Radioactive Waste Management: performance of studies to verify the integrity and overall long-term suitability of the geological formations in which solid, low-level radioactive waste products are stored and to identify improvements in such operations.

11. Power Generation from Solid Wastes: studies to define suitable approaches for handling and delivery of processed solid wastes to power plants, calculations of boiler combustion efficiency to be achieved and identify systems needed for removal of air contaminants from combustion effluent.

12. Advanced Combustion Technology for Fossil Fuels: engineering considerations associated with equipping existing New York power plants with most recent fluidized bed technology will be defined and preliminary planning for demonstration project will be developed.

13. Saratoga Research and Development Center: the Authority owns and operates the Saratoga Research and Development Center at Ballston Spa, New York, a 445 acre site for specialized facilities needed for sophisticated research, development and testing in electric power supply, aerospace and related technologies. Current industrial research organizations at the Center include Exxon Nuclear Company, Inc., Power Technologies, Inc., and the Wright-Malta Corporation.

The staff of the original authority was 29 in 1975. The 1976-77 recommended staffing level for the expanded role of the authority was 214.

Activities for 1976-77 are to include the following:

Research:
- Basic Research-New Energy Technologies.
- Energy Information System and Technology Assessment.
- Environmental, Health and Safety Research.
- Projects Completed or Discontinued.

Development:
- Integrated Energy Supply and Utilization System.
- Power from Solid Wastes.

Development: (continued)
Coal and Solid Waste Gasification.
Laser Fusion Feasibility.
Utilization of Bioconversion Technologies.
Sulfur and Other Fuel Pollutant Extraction Technologies.
Projects Completed or Discontinued.

Demonstration:
Solar Heating and Cooling.
Solar and Wind Energy Conversion.
Energy Conservation and Storage.

The New York State Emergency Fuel Office was created by Executive Order in 1974. The 1976 staffing level was 46. Responsibilities are in conjunction with administration of the mandatory fuel allocation program. In addition to studies directly related to gasoline distribution and sales, major programs included:

1. Coal Reports: a) Coal Report No. 1 analyzes basic problems in the coal industry and their impact on New York State; b) Coal Report No. 2 is an analysis of responses to questionnaires received from large non-utility bituminous coal users; c) Coal Report No. 3 analyzes anthracite coal problems and their impact on New York State industry, utilities, and individual home users.

2. Report on the Economic Impact of the Coal Strike on New York State Industry: analysis of the impact of the bituminous coal strike was based on reports from major users of bituminous coal.

3. Anthracite Coal Data: historical data on the number of customers, stock levels, delivery schedules and supply connections is being collected from New York State retail coal dealers.

Selected Post Secondary Institutions
With Formal Environmental Energy Programs

There are several colleges and universities in New York which offer programs in environmental science and pollution control technology. Information on these programs was gathered from college catalogues selected on the basis of recommendations by professionals in the field, and phone calls to department heads. Only a small percentage of the schools in the state were included in our sample; thus, the programs outlined in this section simply represent the kinds of pollution control training available in the state at the two year, four year, and post graduate college levels. These programs are designed to prepare students for technical or professional positions in pollution control and related areas.

Included in this section are the Cooper Union for the Advancement of Science and Art, which offers an evening master's degree program in Environmental Studies; Cornell University's School of Engineering, which offers master of engineering, master of science, and Ph.D. degrees in Environmental Engineering; Manhattan College, which offers master of environmental engineering and master of environmental science degrees through its Environmental Engineering and Science program; Renssalaer Polytechnic Institute, which offers bachelor's and master's degrees in Environmental Engineering; Erie Community College, which offers a program in Chemical Technology with an option in Environmental Science, leading to the degree of Associate in applied science; and Sullivan County Community College, which offers a one year program in Air and Water Pollution Control Technician Assistance.

SENIOR INSTITUTIONS

Renssalaer Polytechnic Institute
Troy, New York

Program: Environmental Engineering (B.E., M.Eng.)

Hours required for major: Semester - (B.E.) 133, (M.Eng.) 61 hours in addition to three years of pre-engineering programs.
Program Inception: 1955
Staff Size: Ten professors, four associate professors, four assistant professor, seven adjunct faculty.
Enrollment: (B.E.) estimated 20-30, (M.Eng.) estimated 20-30.
Graduates (1976): not currently available
Placement: not currently available
Graduate Work: not currently available

Courses

Water and Wastewater Engineering
Unit Operations in Environmental Engineering
Environmental Engineering Lab and Design I and II
Air Pollution Sources and Effects
Solid Waste Engineering
Nuclear Engineering
Unit Processes in Environmental Engineering
Project or Thesis
Water Resources
Stream Pollution Control
Air Pollution Control
Air and Solid Waste Laboratory
Water Resources
Air and Solid Waste Laboratory
Public Health I
Environmental Radiation Safety Controls
Radiological Engineering
Radiation Biology
Radiochemistry
Chemistry for Engineers
Management and Planning for Pollution Abatement
Mathematical Models of Environmental Systems
Physical-Chemical Waste Treatment
Environmental Impact Analysis
Atmospheric Chemistry
Air Pollution Meteorology
Radiation Biology and Toxicology
Advanced Physical Chemistry
Chemical Kinetics
Resources, Energy, and Environment

Technological Issues
Chemical and Environmental Engineering Seminar
Reading in Environmental Engineering
Chemistry and the Environment

SENIOR INSTITUTIONS

Manhattan College
Bronx, New York

Program: Environmental Engineering and Science (Master of Environmental Engineering, Master of Environmental Science)

Hours required for major: Semester - (Master of Environmental Engineering) 30, (Master of Environmental Science) 34
Program Inception: 1962
Staff Size: Five professors plus supportive faculty.
Enrollment: 58
Graduates (1976): (M.Eng) 14, (M. Env. Sci.) 9
Placement: 23
Graduate Work (Ph.D.): 2

Courses

Mathematical Models II
Environmental Statistics
Mathematical Methods in Engineering
Mathematics for Environmental Engineers
Water Quality Time Series Analysis
Applied Physical Chemistry
Applied Organic Chemistry
Sanitary Analysis
Applied Microbiology
Principles of Water and Waste Treatment I, II
Biological Waste Treatment
Theory of Biological Waste Treatment
Water Resources Hydraulics
Hydrology and Oceanography
Analysis of Natural Water Systems I, II
Systems Analysis and Water Quality Management
Advanced Topics in Water Quality Analysis
Simulation Analysis
Water Resources
Seminar
Special Topics
Thesis
Air Pollution Control: Particulates
Air Pollution Control: Gaseous Pollutants
Environmental Engineering III, IV
Marine Biology
Aquatic Biology

SENIOR INSTITUTIONS

Cornell University
Ithaca, New York

Program: Environmental Engineering (M.S.)

Hours required for major: Semester - 30 plus a design project.
Program Inception: 1971
Staff Size: Seven professors, four associate professors, nine assistant professors:
Enrollment: 50 (estimate)
Graduates (1976): not currently available
Placement: 100%
Graduate Work: an estimated 20%

Courses

Environmental Quality Engineering
Water Quality Control Engineering
Environmental Quality Control Engineering Laboratory
Chemistry of Water and Wastewater
Aquatic Chemistry
Biological Phenomena and Processes
Chemical and Physical Phenomena and Processes
Environmental Quality Control
Solid Waste Management
Industrial Waste Engineering
Environmental Quality
Air Quality Control
Design Project in Sanitary Engineering
Sanitary Engineering Research
Environmental Quality Engineering Colloquium
Special Topics in Sanitary Engineering

SENIOR INSTITUTIONS

The Cooper Union for the Advancement of Science and Art
New York, New York

Program: Environmental Studies (M.S.)

Hours required for major: Semester - 30
Program Inception: 1976
Staff Size: Five professors plus temporary support.
Enrollment: 27
Graduates (1976): 0
Placement: 0
Graduate Work: 0

Courses: Environmental Engineering

Fluid Dynamics and Meteorology
Thermodynamics
Thesis/ Project
Combustion
Heat and Mass Transport
Air Pollution Control Technology I, II
Mathematical Analysis I, II
Air Pollution Planning and Measurement
Air Pollution Planning and Management I, II

Courses: Environmental Planning

Fluid Dynamics and Meteorology
Air Pollution Planning and Management I, II, III
Environmental Law
Environmental Modelling and Simulation
Thesis/Project
Environmental Impact Analysis
Emission Measurements
Mathematical Analysis I, II
Air Pollution Planning and Measurement

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

Erie Community College
Erie, New York

Program: Chemical Technology, Environmental Science Option (A.A.S.)

Hours required for major: Semester - 63
Program Inception: 1972
Staff Size: not available
Enrollment: not available
Graduates (1976): not available
Placement: not available
Graduate Work: not available

Courses

Inorganic Chemistry
Physical Chemistry
Fundamentals of Chemical Engineering
Fundamentals of Chemical Engineering Laboratory
Nuclear Chemistry
Nuclear Chemistry Laboratory
Environmental Health Seminar I, II
Sanitary Chemistry
Sanitary Chemistry Laboratory
Water Supply, Treatment and Distribution
Water Supply, Treatment and Distribution Laboratory
Instrumentation
Instrumentation Laboratory
Wastewater Collection, Treatment and Disposal
Wastewater Collection, Treatment and Disposal Laboratory
Air Resource I, II
Air Resources Laboratory I, II
Environmental Chemistry
Environmental Chemistry Laboratory
Physics - Environmental Science
Environmental Science

COMMUNITY COLLEGES/TECHNICAL INSTITUTIONS

Sullivan County Community College
Loch Sheldrake, New York

Program: Air and Water Pollution Control Technician Assistant (Diploma)

Hours required for major: 4-1-4 System - 32
Program Inception: 1970
Staff Size: Two instructors, two technical assistants
Enrollment: 15
Graduates: an estimated 80%
Placement: an estimated 30%
Graduate Work: approximately 20%

Courses

Technical Math
Biological and Inorganic Effects of Water Pollution
Environmental Pollution Survey
Water Pollution Field and Instrumentation
Water Pollution Chemistry
Air Pollution Chemistry
Air Pollution Field and Instrumentation
Physical Nature of Air and Water Analysis
Biological Effects of Air Pollutants
Seminar in Air and Water Resources
Career Experience in Air and Water Pollution Control

State Legislation

NEW YORK GENERAL

TITLE:

Environmental Conservation Law
New York Statutes ECL 1-0101

PURPOSE:

To conserve, improve and protect the natural resources and environment of the state, and to control water, land and air pollution to enhance the health, safety and welfare of the people of the state.

DEFINITIONS:

1. Air pollution emergency
2. Article
3. Board
4. Commissioner
5. Consolidated health district
6. Council
7. County department of health
8. County health commissioner
9. County health district
10. County legislative body
11. Department
12. Health district
13. Local board of health
14. Local health officer
15. Local public corporation
16. Municipality
17. Part-county health district
18. Person
19. Pollution
20. Public corporation
21. State public corporation

ADMINISTERING AUTHORITY:

Department of Environmental Conservation
State Environmental Board
Local Governmental Units
Council of Environmental Advisers

AUTHORIZATIONS:

To operate and maintain state conservation areas;
To coordinate state environmental plans and policies;
To establish permit and certificate programs relating to management of air, land, water and other resources;
To provide for pollution abatement programs;
To conduct pollution control and ecological studies;
To establish environmental standards and criteria;
To issue regulations pursuant to the act;
To enter and inspect property in enforcement of the act;
To advise the Governor on comprehensive environmental policy.

NEW YORK GENERAL

TITLE:

Environmental Quality Review Law
New York Statutes ECL 8-0101

PURPOSE:

To maintain environmental quality through the requiring of environmental impact statements in state agency actions.

DEFINITIONS:

1. Agency
2. Actions
3. Environment
4. Environmental impact statement
5. Draft environmental impact statement

ADMINISTERING AUTHORITY:

Department of Environmental Conservation
All State Agencies

AUTHORIZATIONS:

To review all current policies to determine environmental compatibility;
To prepare environmental impact statements (EIS) for all proposed actions;
To review and approve all EISs;
To issue regulations and EIS guidelines.

NEW YORK AIR

TITLE:

Air Pollution Control Act
New York Statutes ECL 19-0101

PURPOSE:

To safeguard air resources of the state by abating present air pollution and preventing future air pollution.

DEFINITIONS:

1. Persons
2. Air contaminant
3. Air pollution
4. Air contamination
5. Air contamination source
6. Air cleaning installation
7. Area of the state

ADMINISTERING AUTHORITY:

Department of Environmental Conservation

AUTHORIZATIONS:

To issue regulations relating to air pollution prevention;
To establish air standards for areas of the state;
To develop a comprehensive air pollution abatement plan;
To establish fuel and fuel additive standards;
To generally enforce the act and investigate complaints;
To act as the state lead agency in air matters.

PROHIBITED ACTS:

To violate any standards or regulations issued under the act.

NEW YORK PESTICIDES

TITLE:

Custom Application of Pesticides Law
New York Statutes ECL 33-0901

PURPOSE:

To provide for the control of pesticide usage with the establishment of a licensing and certification program for pesticide applicators.

DEFINITIONS:

1. Aircraft
2. Commissioner
3. Custom application of pesticides
4. Ground equipment
5. Pesticides
6. Restricted use pesticide

ADMINISTERING AUTHORITY:

Department of Environmental Conservation

AUTHORIZATIONS:

To issue regulations pursuant to the act;
To enter and inspect property in enforcement of the act;
To classify pesticides and restrict their usage;
To regulate the storage, transportation and disposal of pesticides;
To establish certification standards and commercial applicator categories;
To certify private and commercial applicaters;
To act as the state lead agency in pesticide matters.

CERTIFICATION OR LICENSING:

Custom applicators must be licensed; private applicators must be certified.

PROHIBITED ACTS:

To engage in custom application of pesticides without certification;
To violate other act provisions.

EXEMPTIONS:

Farmers and others applying on own land or not for hire.

PENALTIES:

Fines of from $50 to $200 for first offense; up to $500 for subsequent offenses.

NEW YORK SOLID WASTE

TITLE:

Solid Waste Collection, Treatment and Disposal Law
New York Statutes ECL 27-0101

PURPOSE:

To encourage the development of economical projects for present and future collection, treatment and disposal of solid waste.

DEFINITIONS:

1. Comprehensive study and report
2. Municipality
3. Refuse
4. Solid waste
5. Solid waste management facility
6. Solid waste management

ADMINISTERING AUTHORITY:

Department of Environmental Conservation
Local Governmental Units

AUTHORIZATIONS:

To provide state assistance to municipalities on solid waste matters;
To issue regulations pursuant to the act;
To issue certificates to septic tank and cess pool cleaners;
To give prior approval to solid waste management facilities.

PROHIBITED ACTS:

To fail to obtain a certificate for septic tank and cess pool cleaning operations;
To fail to obtain approval for construction or operation of solid waste management facilities;
To violate any other act provisions.

PENALTIES:

Fines of up to $250.

NEW YORK WASTE WATER

TITLE:

Water Pollution Control Law
New York Statutes ECL 17-0101

PURPOSE:

To safeguard the waters of the state by preventing future pollution and abating existing pollution.

DEFINITIONS:

1. Person
2. Waters
3. Marine district
4. Sewage
5. Industrial waste
6. Other wastes
7. Standard
8. Sewer system
9. Treatment works
10. Disposal system
11. Outlet
12. Shellfish
13. State Pollutant Discharge Elimination System
14. National Pollutant Discharge Elimination System
15. Effluent standard
16. Point source
17. Pollutant
18. Schedule of compliance
19. Toxic pollutant
20. New source
21. Standard of performance
22. Toxic and pretreatment effluent standard

ADMINISTERING AUTHORITY:

Department of Environmental Conservation

AUTHORIZATIONS:

To classify waters of the state;
To adopt water quality standards;
To continue past regulations and issue new regulations relating to water pollution;

AUTHORIZATIONS (Cont'd):

To abate and prevent water pollution;
To administer the SPDES permit program;
To conduct water pollution investigations;
To conduct water quality monitoring;
To act as the state lead agency in water pollution matters;
To approve all disposal system construction;
To enter and inspect property in enforcement of the act;
To control high-phosphorus cleansing agents;
To issue abatement orders;
To generally enforce the act.

PROHIBITED ACTS:

To discharge polluting matter into waters of the state;
To cause pollution of marine district waters;
To construct or alter disposal facility without permit;
To violate the terms of any permit;
To discharge any radiological, chemical or biological warfare agent into waters of the state;
To violate effluent limitations;
To sell or distribute cleansing products without proper label or in excess of 8.7% phosphorus;
To violate orders of the department.

PENALTIES:

Criminal - violations constitute a misdemeanor;
Civil - fines of up to $1,000.